



AAPG

EXPLORER

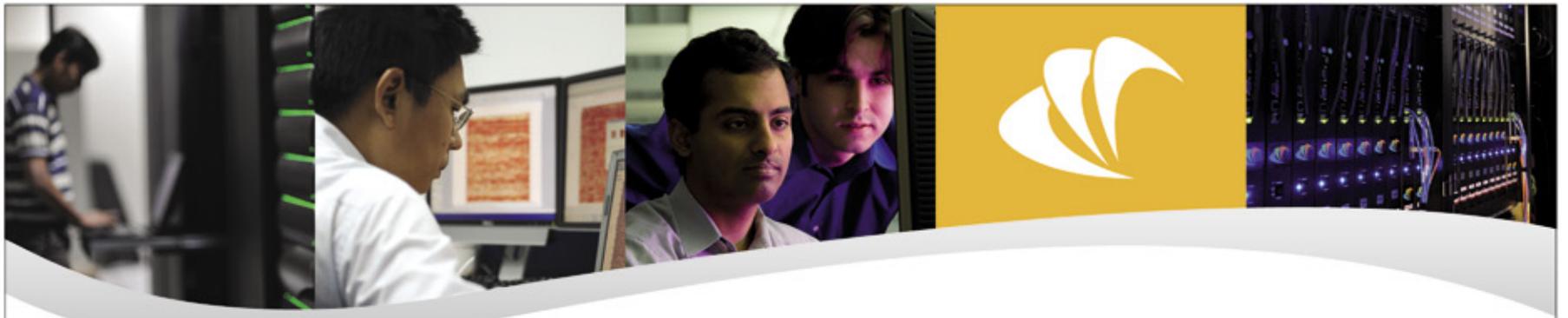
NOVEMBER 2012



Icebreaker

Technology, innovation
help seismic crews
in Arctic networking

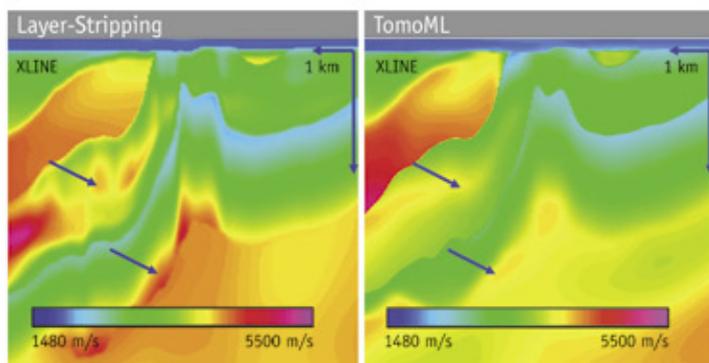
See page 26



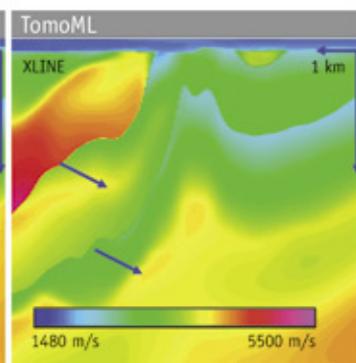
Next-Generation Tomography

TomomML

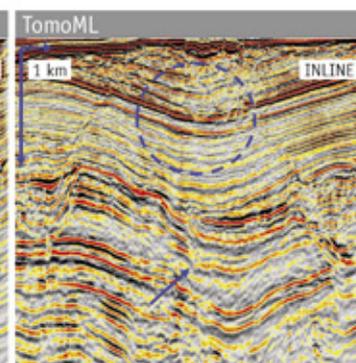
Knowledge Empowers



Conventional layer-stripping tomography showing model instabilities within the Cretaceous and Jurassic.



PSDM imaging using conventional layer-stripping tomography.



PSDM imaging using next-generation multi-layer tomography (TomomML).

Images courtesy of Tulip Oil Netherlands B.V., PA Resources UK Ltd and EBN B.V.

CGGVeritas was recently challenged with improving the imaging of a geologically complex field for reserves estimation. Traditional seismic processing workflows were limiting image quality, which led us to design a next-generation tomography solution for velocity model building (**TomomML**). **TomomML** simultaneously updates multiple, uniquely constrained layers, through a joint, non-linear update of velocity and horizons. The subsequent uplift in velocity model accuracy had dramatic effects on the final images, increasing the customer's confidence in the reservoir definition and allowing for better economic assessment.

“TomomML delivers exceptional, high-quality velocity models and seismic images in a dramatically reduced time frame. This technology continues to exceed our expectations and offers outstanding benefits for our customers. It meets the oil industry's requirement for earlier prospect evaluation while also promoting increased confidence in the seismic image for critical decision-making.”

Steve Hollingworth
PIR Group Manager, CGGVeritas

Delivering SeisAble Benefits
cggveritas.com/PIR



PRESIDENT'S COLUMN

Changing Opinions, One Thought at a Time

By TED BEAUMONT

AAPG members realize that finding oil and gas is at best an arduous, difficult task:

- ▶ We need to create a valid concept using imagination and data.
- ▶ Next, we must convince someone with financial resources that oil and/or gas can be found and profitably developed where no one else believes it exists.
- ▶ After the test well is drilled, we are either the hero or the goat – and most of the time we are the goat, because wildcat wells are still dry holes 90 percent of the time.

Without the incentive to look for oil and gas, it would be impossible to withstand the emotional pain of the dry holes that are part of the exploration process.

Incentive is one half of the ingredients necessary for having a healthy petroleum industry. The other half is freedom to explore; therefore politics plays a crucial role.

One of my favorite politically oriented quotes is from legendary geologist Wallace Pratt. It seems especially appropriate today. In 1952, he said:

“... So long as a single oil-finder remains with a mental vision of a new oil field to cherish, along with freedom and incentive to explore, just so long new oil fields may continue to be discovered.” (AAPG BULLETIN, 1952).

Freedom and incentive to explore are still necessary today – not just for the United States, but for the whole world.

I heard a speaker in September at the AAPG International Conference and Exhibition in Singapore say that the biggest impediment to developing unconventional resource plays outside of North America is politics.



BEAUMONT

Freedom and incentive to explore are still necessary today – not just for the United States, but for the whole world.

The public around the world has been informed of potential catastrophes caused by hydraulic fracture stimulation of reservoirs. They worry about drinking water contamination and earthquakes caused by hydraulic fracturing – never mind that there is still no direct evidence to confirm those connections.

The unconventional resource play is the best and most recent example of the product of freedom and incentive. The play has provided the United States with great economic benefits. For example, in North America gas is \$3/MCF versus \$10/MCF most everywhere else. Even so, the United

States teeters on the brink of taking away these two critical ingredients.

The current U.S. administration likes to point out that current oil import levels have fallen to the level that they were 20 years ago. That's great news, but the U.S. government has made drilling on federally owned land more and more difficult.

Ninety-one percent of wells producing from unconventional reservoirs in the United States are on private land. To this point the federal government of the United States has discouraged the development of this valuable and critical resource that is responsible for the drop in U.S. oil

imports (see related story, page 42).

* * *

Unconventional resource plays are beginning to take root in basins outside of North America. Basins with emerging unconventional plays are located in Argentina, China, India, Indonesia and Australia.

Will they have the same remarkable impact that they have had in North America? That remains to be seen, mainly because in many of those places politics is the number one impediment.

Past AAPG president Scott Tinker once noted that a member of the U.S. Congress told him he agreed that the petroleum industry is not the evil industry it is portrayed to be, but he would still vote against it because that was what his or her voters wanted. Scott told us that the only way to change anything politically is to convince

[See President, next page](#)

Bios and Videos for AAPG Candidates Online

Video statements from all AAPG Executive Committee officer candidates continue to be available online at www.aapg.org.

Biographies and individual information for candidates also remains available online.

Ballots for the election will open in spring 2013. The person voted president-elect will serve in that capacity for one year and will be AAPG president for 2014-15.

The slate is:

President-Elect

- ☐ Randi S. Martinsen, University of Wyoming, Laramie, Wyo.
- ☐ Kay L. Pitts, Aera Energy, Bakersfield, Calif.

Vice President-Regions

- ☐ István Bérczi, MOL Hungarian Oil and Gas, Budapest, Hungary.
- ☐ John G. Kaldi, Australian School of Petroleum, University of Adelaide, Adelaide, Australia.

Secretary

- ☐ Richard W. Ball, Chevron Upstream, Southern Africa SBU, Houston.
- ☐ Sigrunn Johnsen, independent consultant with ProTeamAS, Stavanger, Norway.

Editor

- ☐ Colin P. North, University of Aberdeen, Aberdeen, Scotland.
- ☐ Michael Sweet, ExxonMobil Production, Houston.

STAFF

AAPG Headquarters:
1-800-364-2274 (U.S. & Canada only)
others 1-918-584-2555

Managing Editor

Vern Stefanic
email: vstefan@aapg.org

Communications Project Specialist

Susie Moore
email: smoore@aapg.org

Graphics/Production

Matt Randolph
email: mrandolph@aapg.org

Advertising Coordinator

Brenda Merideth
P.O. Box 979
Tulsa, Okla. 74101
telephone: (918) 560-2647
(U.S. and Canada only: 1-800-288-7636)
(Note: The above number is for advertising purposes only.)
fax: (918) 560-2636
email: bmer@aapg.org

CORRESPONDENTS

David Brown
Louise S. Durham
Susan R. Eaton
Barry Friedman
Ken Milam

TABLE of CONTENTS

8 California dreaming: Some people see the **Monterey Shale**, and think “oil.” Others, however, see a slippery challenge.

14 A new kid in town: **Nodal technology** is proving itself a game-changer on data acquisition in the venerable **Permian Basin**.

20 Improving conditions: Technological advances in **seismic acquisition** have led to successful operations in the **Gulf of Mexico** – and those lessons are being shared around the world.

26 The big chill: **Arctic ice** used to be a huge deterrent to seismic operations – but no more.

38 Crews face a number of challenges in acquiring **3-D seismic** in the Arctic. Fortunately, there are a number of solutions, too.

40 Walking through time: **Geology** and the history of the planet is on display on a number of **buildings in Calgary**, free for all to see. You just have to know where to look.

50 For the first time ever, **Singapore** played host for the AAPG **International Conference and Exhibition** – and this ICE proved to be very nice, indeed.

REGULAR DEPARTMENTS

Washington Watch.....	42
Historical Highlights	44
Geophysical Corner	54
Regions and Sections	60
ProTracks.....	62
Foundation Update.....	63
Spotlight On	64
Professional News Briefs.....	65
Classified Ads	68
Director's Corner	70
Divisions Report (EMD).....	70

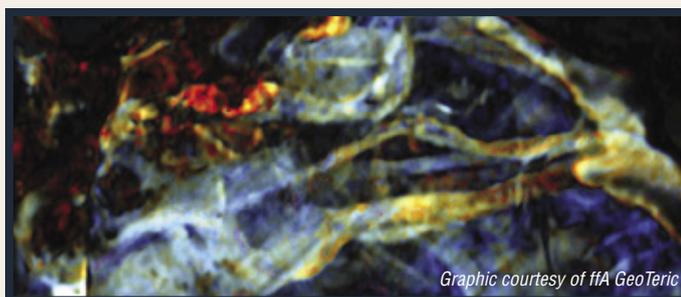
ON THE COVER:

The icebreaking vessel Oden clears the way in the Arctic waters for the Geo Explorer, which was on a seismic acquisition mission for ION Geophysical. Under-ice acquisition once was an almost impossible deterrent to seismic crews, but modern technology, integrated ice-management and creative solutions have opened the Arctic for successful exploration – a good thing, since it is estimated that about 25 percent of the world's undiscovered hydrocarbon resources are there, waiting to be tapped. See story on page 26. Photo courtesy of ION Geophysical.

To the left, what appears to be a pretty collage of colors is actually a clue to finding oil in the North Sea. Story on page 32.



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



Graphic courtesy of ION Geophysical

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

Advertising rates: Contact Brenda Merideth, AAPG headquarters. Subscriptions: Contact Veta McCoy, AAPG headquarters. Unsolicited manuscripts, photographs and videos must be accompanied by a stamped, self-addressed envelope to ensure return. The American Association of Petroleum Geologists (AAPG) does not endorse or recommend any products or services that may be cited, used or discussed in AAPG publications or in presentations at events associated with AAPG. Copyright 2012 by the American Association of Petroleum Geologists. All rights reserved. Note to members: \$6 of annual dues pays for one year's subscription to the EXPLORER. Airmail service for members: \$55. Subscription rates for non-members: \$75 for 12 issues; add \$72 for airmail service.

President
from previous page

the public, and the public will convince the politicians.

"Switch," the energy movie featuring Scott, goes a long way toward doing just that. It is an entertaining and informative film.

* * *

In last month's EXPLORER, Tom Temples, president of the Division of Environmental Geosciences (DEG), said, "We geologists have traditionally been slow to react – if at all – to explain what we do and how it affects the environment and surrounding communities. This inaction – or 'mis-action' – has resulted in the

imposition of regulations and created the image of the industry as an evildoer."

In Tom's EXPLORER column he explains further, "We need to get involved at all levels and get the word out to politicians and the public. How can you as a geoscientist get involved? Take any opportunity to speak to the public and the regulators." If you aren't a speaker, you can get involved with DEG and help compile facts and figures that can be distributed via the DEG website.

As professional geologists we have a duty to inform the public for their sakes, but also for ours.

So get informed – and start changing opinions one at a time.

Ted Beaumont

Set Dec. 3-5 in Houston

ATC Back – And Bigger

By VERN STEFANIC, EXPLORER Managing Editor

Online registration remains open for a conference that's been called the "best of the best" for its technical program and cutting-edge approach to 21st century exploration in the world's most challenging but potentially rewarding environment.

The second Arctic Technology Conference will be held Dec. 3-5 in Houston at the George R. Brown Convention Center.

More than 1,400 attendees from 23 countries attended the inaugural ATC in 2011, and pre-registration totals indicate

this year's meeting could be even larger.

ATC is built upon the Offshore Technology Conference's model of offering a multidisciplinary approach to its technical program, which features nearly 150 papers and posters.

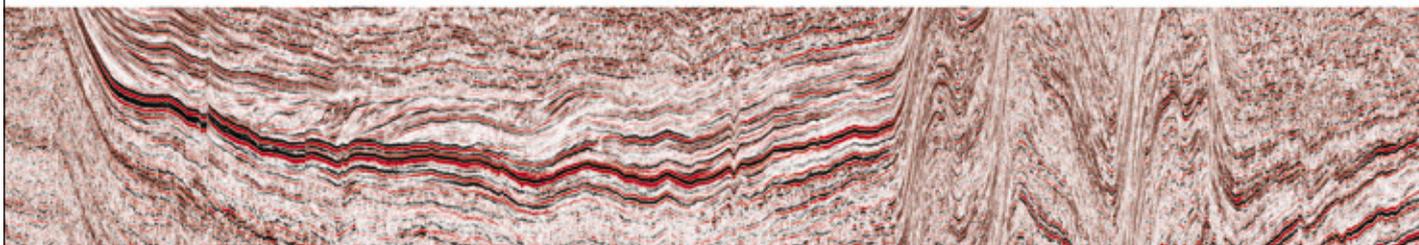
"This ATC is a conference you don't want to miss if you work the Arctic," said AAPG Honorary member and ATC chair John Hogg.

"The Arctic is the final frontier for oil and gas exploration and development," he said. "Our second ATC takes what we learned from our inaugural conference and builds a conference with more focus on flow assurance, oil spill cleanup and half a dozen high quality panels on key Arctic issues.

"The ATC conference brings together the best of the best," Hogg added, "industry geoscientists and engineers, academics and executives, to learn, share and meet other Arctic experts."

AAPG's official representatives on the ATC committee also include Michael Enachescu, MGM Energy Corp.; Don Gautier, U.S. Geological Survey; and David Schoderbek, Conoco-Phillips.

WHEN ARCTIC SEISMIC COUNTS...



...COUNT ON FUGRO

Fugro Multi Client Services holds a continuously expanding database of 2D and 3D non-exclusive seismic data covering most of the major hydrocarbon basins in the Arctic.

Our interactive data library gives an all-encompassing overview of our global data volume. New projects and status updates on current acquisitions are regularly updated on our website.

Improving your exploration decisions.

Meet us at:

SEG

Las Vegas
04-09 November 2012
Hall B, Booth 1945

PETEX

London, UK
20-22 November 2012
Booth F17

Fugro Multi Client Services

multiclient@fugro.no
www.fugromulticlient.com

Fugro Seismic Services: Fugro-Geoteam • Fugro Seismic Imaging • Fugro Multi Client Services • Fugro Seabed Seismic Systems



The conference will begin with a plenary session, co-chaired by Hogg and Han Tiebout, offering talks on:

- ▶ The Norwegian Arctic: Outlook and Perspectives (Jostein Mykletan, Consul General of Norway).
 - ▶ Offshore Arctic Oil and Gas Activity Profile: Policy and Market Drivers and Restraints to Offshore Hydrocarbons Development in the Arctic (Jamie Balmer, Infield Systems).
 - ▶ The TOTAL Adventure in the Arctic (Michael Borrell, Total E&P).
 - ▶ 2012 – A Pivotal Year for Arctic Oil and Gas (Robert Blaauw, Shell Oil).
- Other meeting highlights include:
- ▶ Four panel discussions, on "Flow Assurance Challenges and Arctic Production," "Oil Spill Preparedness," "Regulatory Governance" and "Future Directions for R&D Between Industry and Academia."
 - ▶ Four topical luncheons, on "Russian Arctic Petroleum Resources," "The New Route for Tanker Operators," "Shell's 2012 Arctic Exploration: What Happened and What's Next" and "Statoil Crossing Arctic Energy Frontiers."
 - ▶ Two topical breakfasts, on "Rolling the Dice on the Ice – Acquiring Geophysical Data in the Arctic Ocean" and "A Tale of Two Icebreakers: Geophysical Surveying in the High Arctic."

Complete technical program details and registration information can be found at arctictechnologyconference.org.

Studio

E&P KNOWLEDGE ENVIRONMENT



Making
knowledge
work

Capture and share knowledge for a whole new level of productivity

Get instant team updates, add unstructured information, access Web map services, and collaborate with experts across your organization—with the Studio* E&P knowledge environment in the Petrel* platform.

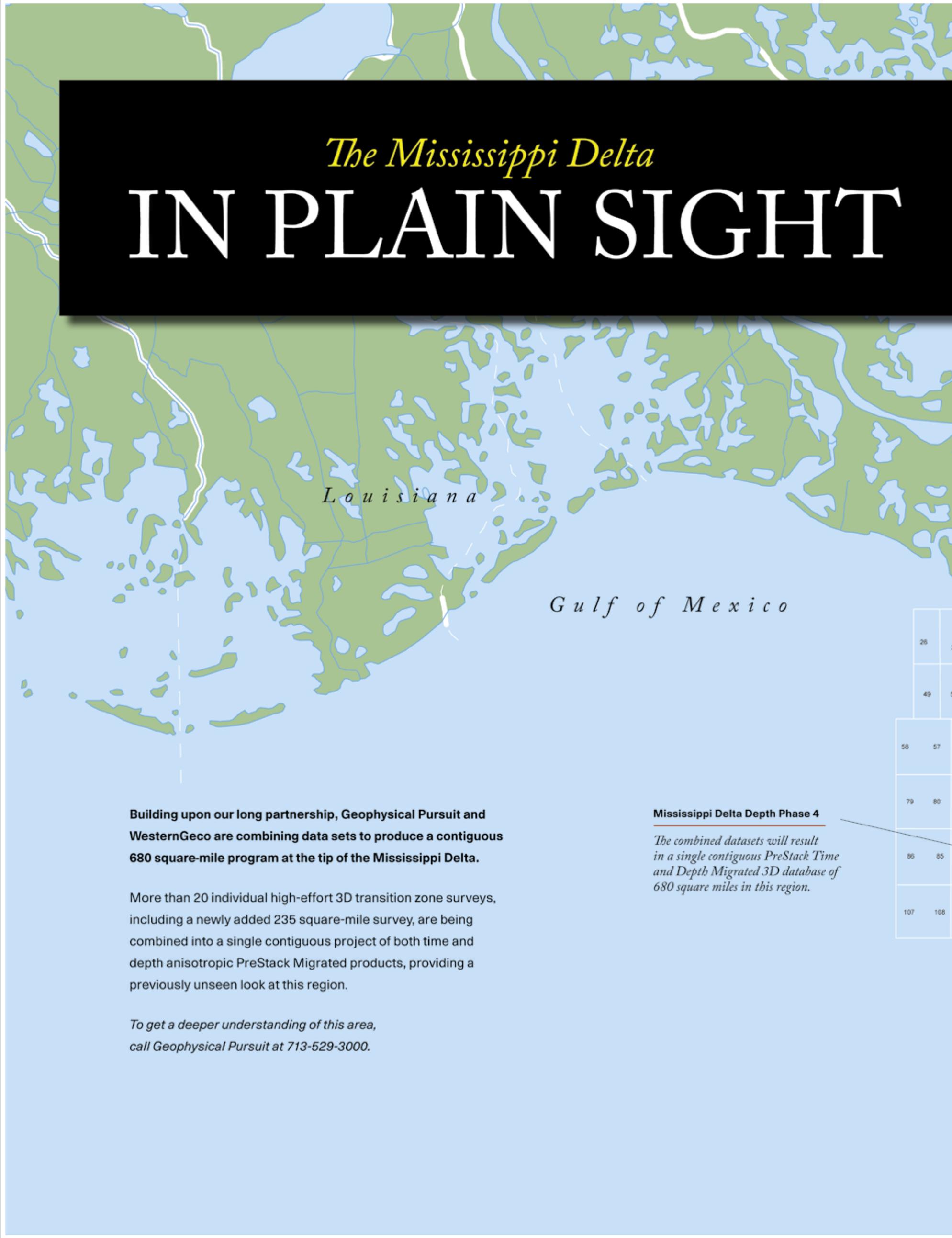
Asset teams can see more, do more, and understand more, leveraging this multiuser enterprise environment to capture and apply critical knowledge.

Making knowledge work.

www.slb.com/studio

Global Expertise | **Innovative Technology** | Measurable Impact

Schlumberger



The Mississippi Delta
IN PLAIN SIGHT

Louisiana

Gulf of Mexico

Building upon our long partnership, Geophysical Pursuit and WesternGeco are combining data sets to produce a contiguous 680 square-mile program at the tip of the Mississippi Delta.

More than 20 individual high-effort 3D transition zone surveys, including a newly added 235 square-mile survey, are being combined into a single contiguous project of both time and depth anisotropic PreStack Migrated products, providing a previously unseen look at this region.

To get a deeper understanding of this area, call Geophysical Pursuit at 713-529-3000.

Mississippi Delta Depth Phase 4

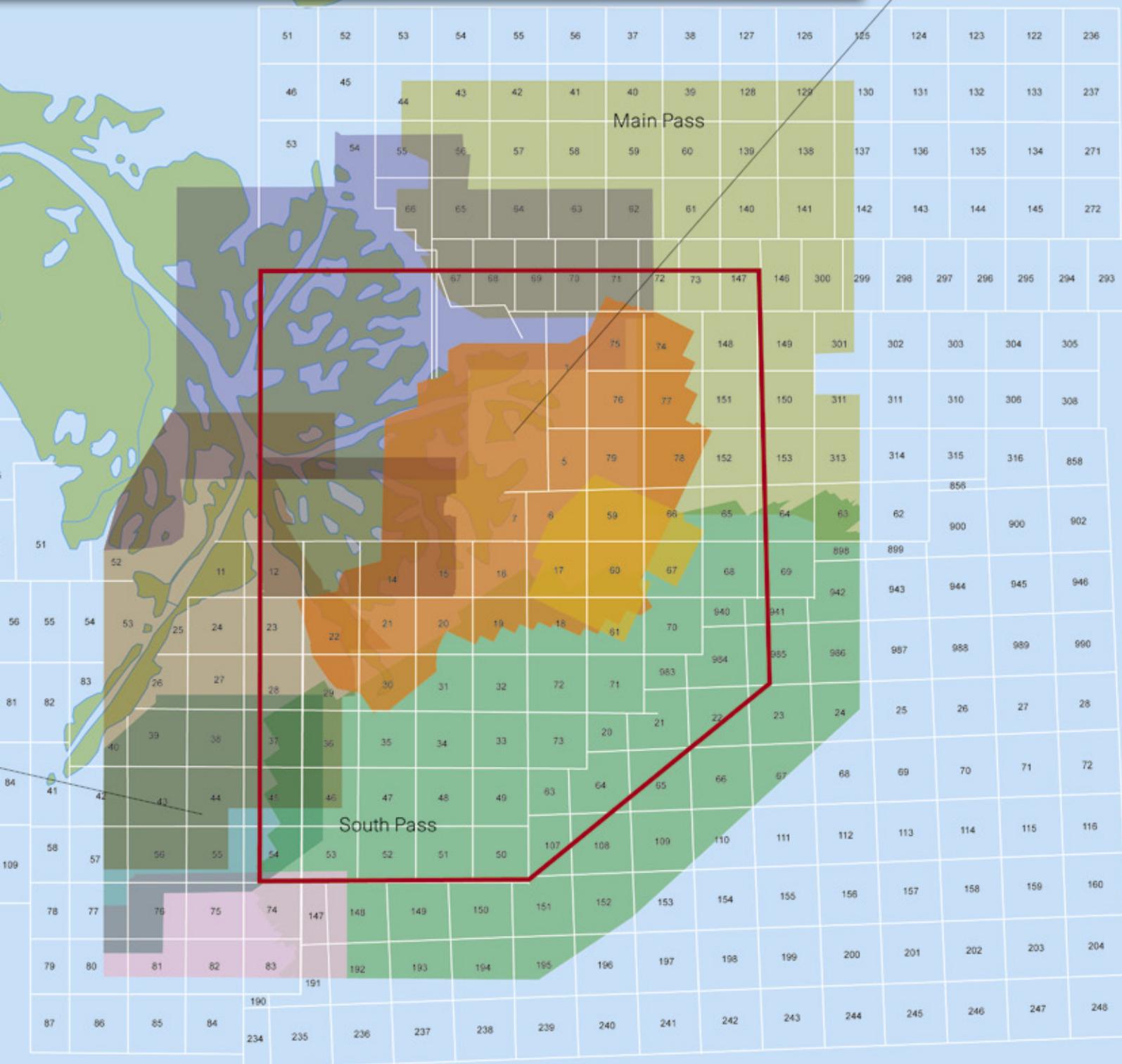
The combined datasets will result in a single contiguous PreStack Time and Depth Migrated 3D database of 680 square miles in this region.

26	25
49	50
58	57
79	80
86	85
107	108



235 square miles

The recently added 235 square-mile 3D survey completed our 680 square-mile coverage of this area.



www.geopursuit.com • 713-529-3000



Looking at its resource play potential

The Monterey Shale: Big Deal, or Big Bust?

By DAVID BROWN, EXPLORER Correspondent

If you're talking about hydraulic fracturing, you might call this play a crackpot idea.

If you're talking about tubulars, you might call it a pipe dream.

The new hunt for unconventional oil production in California has to be called ... unconventional.

In the late 1840s, Californians shouted, "There's gold in them thar' hills!" Today the rallying cry is, "There's oil in that thar' Monterey Shale!"

But producing Monterey Shale oil could make panning for gold look easy.

"What people are looking for is, 'Is there a secret to opening this thing up?' To my knowledge, nobody has really done that yet," said AAPG member Don Clarke, a Los Angeles consulting geologist who has worked the L.A. Basin since 1974 and counts the City of Beverly Hills among his clients.

Could California's Monterey Shale turn into another huge shale oil play?

The definitive answer is:
Maybe.



CLARKE



The locations of California's Monterey Formation.

The Monterey/Santos shale play in southern California was estimated to hold 15.42 billion barrels, or 64 percent of the total. By comparison, the Bakken Shale was projected to hold 3.59 billion barrels of shale oil resource and the Eagle Ford 3.35 billion.

So the Monterey could hold twice as much recoverable shale oil as the Bakken and Eagle Ford combined.

Sounds good, until you realize there is no truly successful Monterey resource play to date.

Some reports have speculated that the southern California play area for the Monterey Shale is too tectonically faulted and fragmented for development by horizontal drilling.

Clarke thinks that isn't true.

To him, the biggest problems are characterizing the shale across the play area, understanding the Monterey stratigraphy and dealing with government regulations affecting drilling and development.

Unlike some shales, the Monterey Shale doesn't present a highly consistent picture. Instead, "it changes dramatically wherever it is in California," Clarke said.

He said it's important to identify where the Monterey is dolomitic or siliceous and brittle – and therefore theoretically more responsive to stimulative hydrofracturing – and where it is more calcereous and ductile.

"We have to understand the characteristics of the rock and how the facies changes across the basin," he said.

Effective horizontal development could be possible in most of the Monterey, but nothing says it will be easy.

"The problem is, with any horizontal well you want to know where you are," Clarke noted. "You have to know

Sounds Good, But ...

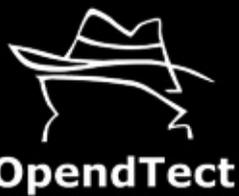
California petroleum geologists know the Monterey Shale as a prolific source rock for many of the state's large oil fields. Clarke said interest in tapping the Monterey comes in cycles, the latest peak occurring about 20 years ago.

When the combination of horizontal drilling and hydraulic fracturing began to unlock shale production in other parts of the country, the Monterey Shale started getting a closer look.

That interest heated up last year, when the Energy Information Administration (EIA) of the U.S. Department of Energy issued an 82-page report titled "Review of Emerging Resources: U.S. Shale Gas and Shale Oil Plays."

Citing a commissioned study by INTEK Inc., the EIA put technically recoverable shale oil resources in the onshore lower 48 states at 23.9 billion barrels.

See Monterey, page 10



Free
seismic interpretation software

Open Source
development environment

Commercial plugins
game-changing functionalities



www.opendtect.org

**WE CAN SIMPLIFY YOUR
SEISMIC WORK OR TAKE YOU**

**PLACES
YOU
COULDN'T
GO BEFORE.**

OR BOTH.

For cable-free seismic done right,
go to fairfieldnodal.com/trucablefree.



SYSTEMS ACQUISITION LICENSING PROCESSING IMAGING

Monterey
from page 8

your stratigraphy. Well control is very important."

In the Southern California/L.A. Basin area, "there is a lot of stuff unknown," he said. "The other thing is that there has been 2-D seismic in the L.A. Basin but no 3-D seismic, except for what we've done in the Long Beach area."

Several companies are looking at the Monterey Shale as a resource play, taking various approaches to the problem, but no one has been able to characterize the Monterey's geology and develop a fully successful approach to tapping its potential.

"The oil companies aren't talking about it yet. Because they can't,"



KUSTIC

"The shale so far has been shale oil. That's because of the maturity of the shale."

Clarke observed.

"The logging companies, like Schlumberger, have tried to do this," he added, "but in my mind with only limited success."

The Solid Rock

In California, working the Monterey as a resource play could be the only other new, unconventional game in

town. The state is already known for its heavy oil production.

"Our biggest unconventional resource in California is the diatomite oil - we have these diatomaceous formations," said AAPG member Tim Kustic, state oil and gas supervisor for California's Division of Oil, Gas and Geothermal Resources (widely known as DOGGR, pronounced "Dogger").

"The key to unlocking that was the

realization that the industry could use cyclic steam," Kustic said. "Basically, it's a steam frac that creates channels and allows oil to flow into the well and back to the surface."

DOGGR doesn't keep the statistics, Kustic said, but he knows the unconventional oil production is a significant part of California's output.

"I've heard it is somewhere in the range of 20 percent of the state's production," he said.

While California does have shale deposits, the organic rich Monterey Shale being a prime example, it doesn't have the broad shale gas potential that's led to so much activity in other parts of the country.

"The shale so far has been shale oil. That's because of the maturity of the shale," Kustic noted.

"As far as shale gas, there isn't any significant shale gas operation in the state," he said. "There has been fracing, but it's been tight gas."

Kustic said "the vast majority of fracing that's been done in California has been done in vertical wells," including the stimulation applied to tight sands in conventional reservoirs in the Sacramento Basin, in the northern half of the state.

"One of the limiting factors is that all the fracing equipment has had to come out of Bakersfield, so you had 300-400 miles of transportations cost," he said.

That leaves the Monterey Shale, better known as an oil source, as California's leading, potential unconventional shale play.

"Now they are looking at the Monterey as not only a source rock," Kustic said, "but they are also looking at it as a reservoir rock."

Risky Business

Unconventional gas would help the local energy picture, although the state relies on a variety of energy sources, not just natural gas, for electrical generation. California has an established geothermal resource and is developing more wind and solar power.

According to the EIA, about 60-65 percent of California's electricity comes from natural gas, 15-16 percent from hydroelectric and 10 percent from renewables. Almost two-thirds of the rest come from nuclear power plants.

"Statewide, we'll take those electrons any way we can get them," Kustic said.

The active Monterey/Santos shale play area is about 1,750 square miles in the San Joaquin and L.A. basins, the EIA reported. In the play area, the shale is 1,000-3,000 feet thick at depths ranging from 8,000-14,000 feet.

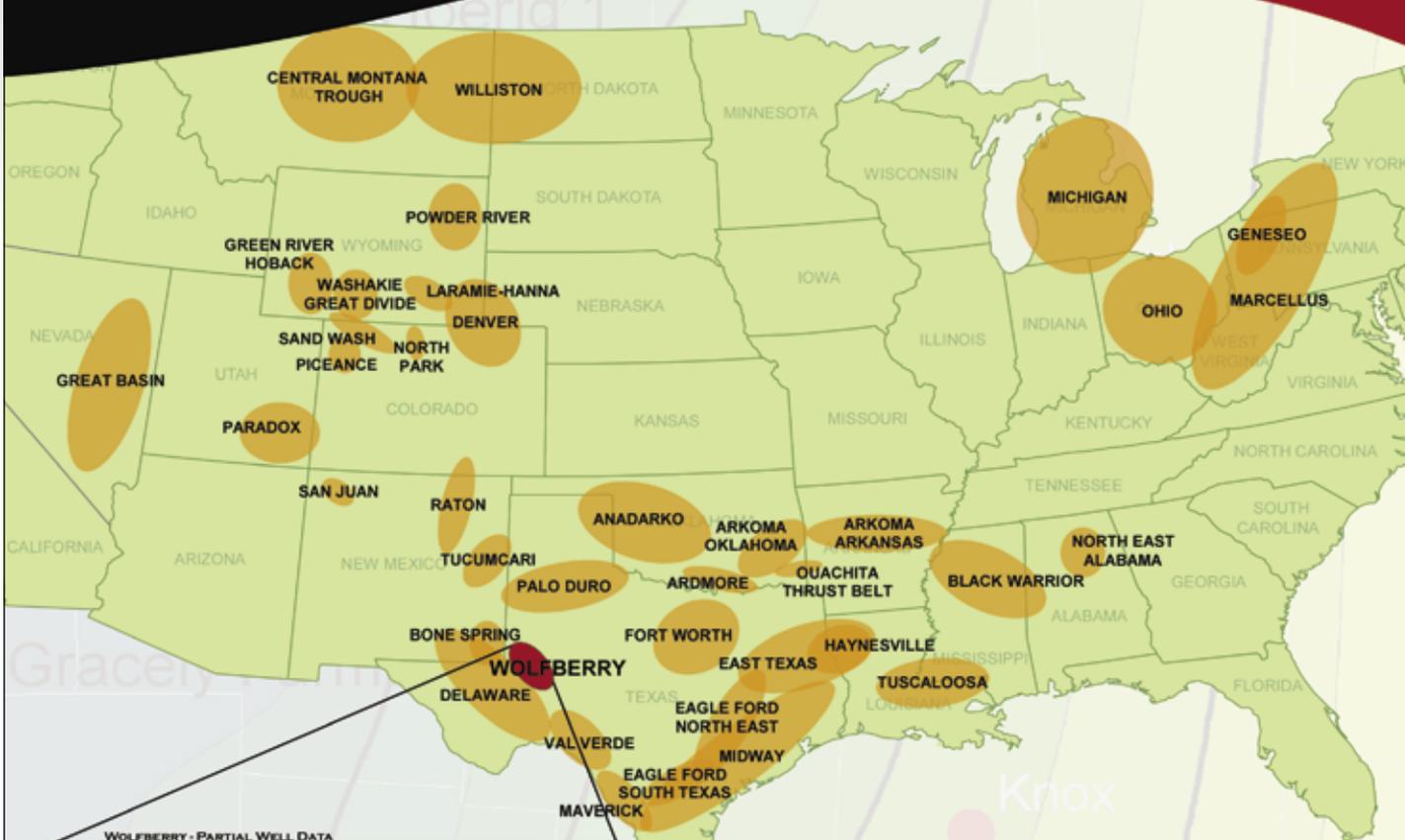
Clarke said the Monterey can be found at various depths in California, down to 30,000 feet in the L.A. Basin. The shale is organically rich, widespread in and around the play area, and easily recognized.

"It's gotten the nickname 'nodular shale.' It's very obvious. When you go in and core it, you can see the nodules," he said.

Occidental Petroleum Co. holds by far the biggest Monterey Shale net acreage. Other players include Venoco Inc., Plains Exploration & Production Co. and National Fuel Gas Co.

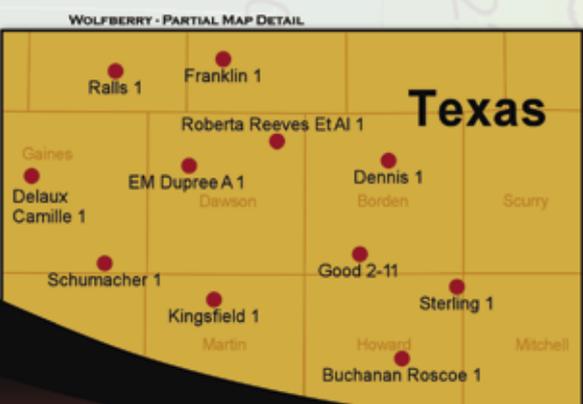
Oxy seems content to build upon previous experience in the Monterey; Venoco is pursuing an active program in the shale.

GAS PROSPECTING JUST GOT EASIER - AND MORE ACCURATE.



WOLF BERRY - PARTIAL WELL DATA

API	Operator Name	Well Name	Well #	County	State	Lat	Long
43113300000000	American USA Inc.	Demco	1	Madison	TX	32.8127080	-101.4584077
43113300000000	American Quest Petroleum Co.	Coast	2-11	Madison	TX	32.8176043	-101.5121183
43113300000000	Chadron Oil Company	Linda 55B	1	Madison	TX	30.5832098	-100.0760004
43113300000000	New Pacific Oil Company	Linda 5A	1	Madison	TX	31.0727097	-101.4832194
43113300000000	Shell Oil Corp.	Nebraska Reservoir 32-01	1	Madison	TX	32.8682075	-100.7020292
43113300000000	Nebraska Oil Co.	Shell 55-01	1	Madison	TX	32.8104044	-102.0680042
43113300000000	Shell Oil Company	Schumacher	1	Madison	TX	32.8104044	-102.0680042
43113300000000	Exxon Corp.	Exxon Camille	1	Madison	TX	32.7892070	-101.5810070
43113300000000	TEC Oil	J.C. Clark	1	Madison	TX	31.8980067	-101.3960050
43113300000000	Union Oil Co. of Calif.	Edward 5m	1	Madison	TX	32.0671048	-101.7290066
43113300000000	Midcon Drilling Company	Buchanan Reservoir	1	Madison	TX	32.7881008	-101.8700079
43113300000000	Calumet Oil Corp.	Walling	1	Madison	TX	32.4911044	-101.1900074
43113300000000	Waco Oil Co.	J.C. Reed	1	Madison	TX	31.2621098	-100.7020292
43113300000000	Waco Oil & Gas Co.	Producers 30M2	1	Madison	TX	31.4292048	-101.7480084
43113300000000	Shell Oil Corp.	Exxon 55-01	1	Madison	TX	32.7892070	-101.5810070
43113300000000	Agathe Corp.	Pharis	1	Madison	TX	31.8980067	-101.3960050
43113300000000	Shawnee Oil	Clayton 11 Extension	1	Madison	TX	31.8980067	-101.3960050
43113300000000	North County LIME CO.	Stratford	1	Madison	TX	32.0551026	-101.9931070
43113300000000	Great Western Drilling Company	St. Dennis	1	Madison	TX	31.8980067	-101.3960050
43113300000000	Marine Resources Co.	DeLoe Bay 100	10	Madison	TX	31.8911014	-102.3702077
43113300000000	Stratford & Nelson Co. Limited	St. Dennis	1	Madison	TX	31.8980067	-101.3960050



COMPREHENSIVE DATA PACKAGES FOR U.S. PETROLEUM BASINS

Weatherford Laboratories has assembled comprehensive data on 39 U.S. shale basins, encompassing in excess of 2000 wells and over 25,000 samples. These packages screen each basin by county and region for thermal maturity, organic richness and mineralogy - and more basins are being added.

Unlike regional studies that take months or years to complete, our data packages are available now. What's more, there is no required contribution on your part, so your proprietary information stays secret.

Get up to speed quickly on an area. Become an expert overnight on a prospective play. Explore the possibilities without buying a lease, drilling a well, or taking time to test samples.

To learn more, visit weatherfordlabs.com today. You could find more untapped gas tomorrow.

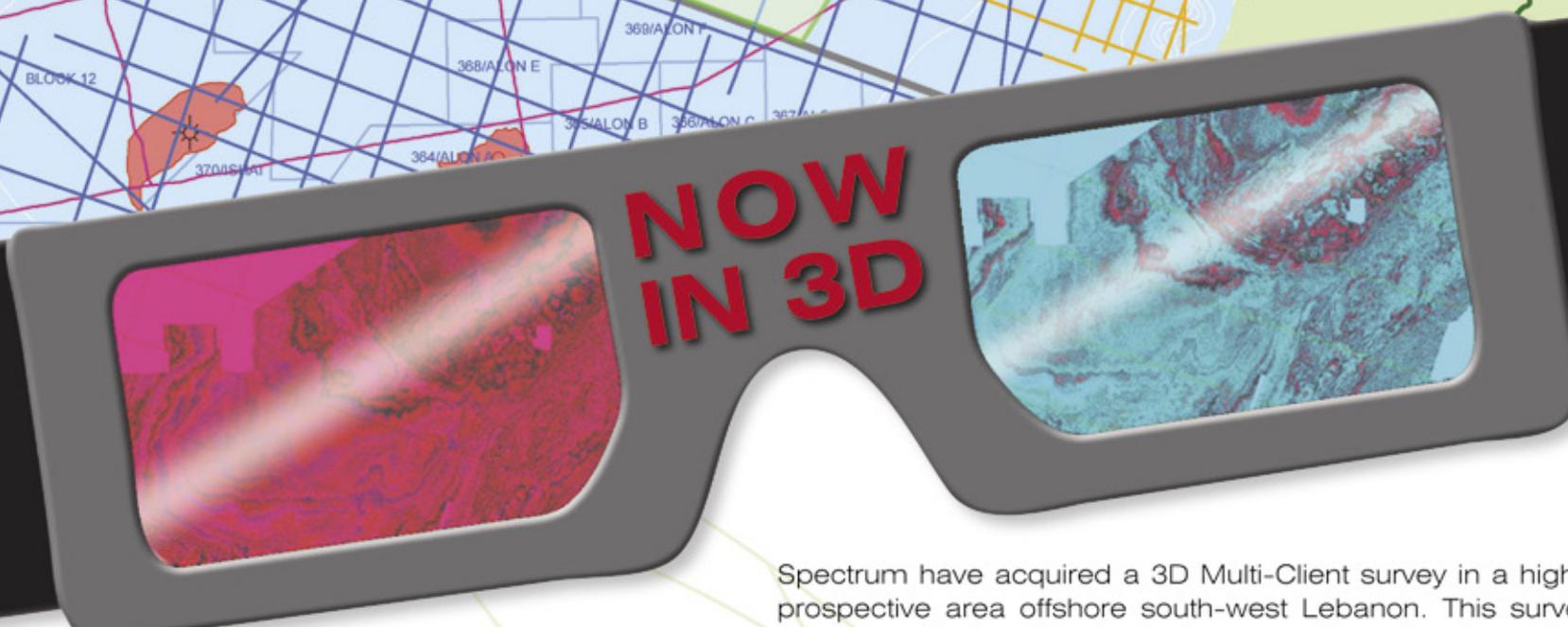
WeatherfordLabs.com

USBasins@WeatherfordLabs.com

See us at
PETEX 2012
 booth #D10

Lebanon

New 3D Multi-Client Survey Offshore Lebanon



Spectrum have acquired a 3D Multi-Client survey in a highly prospective area offshore south-west Lebanon. This survey provides valuable 3D seismic data to assist exploration efforts in a strategic area of the Levantine Basin. The initial phase covers 2,320 square kilometres.

The study area is ranked as "high prospectivity" as defined by Beicip Franlab following their study conducted on behalf of the MEW.

Final products will be available by the end of 2012. The Lebanese government have indicated that their first ever licensing round will open early 2013.



in association with



+44 1483 730201
 mc-uk@spectrumasa.com
 www.spectrumasa.com

'It's not a simple problem'

Monterey Development Possible – Eventually

By DAVID BROWN, EXPLORER Correspondent

Monterey Shale oil development will happen – but it could take a decade, said AAPG member Fred Aminzadeh, AAPG member and professor of petroleum engineering at the University of Southern California in Los Angeles and a former president of the Society of Exploration Geophysicists.

Aminzadeh serves as executive director of the USC Reservoir Monitoring Consortium and Induced Seismicity Consortium, as well as managing director of the USC Global Energy Network.

"My best estimation is, over the next



AMINZADEH

10 years we will see a game change in the Monterey Shale," he said.

He naturally thinks seismic technology

"My best estimation is, over the next 10 years we will see a game change in the Monterey Shale."

and other geophysical methods will be a key part of any progress in the Monterey Shale, "not just conventional, but three-

component and passive seismic," he said.

Oil and gas associated with the Monterey as a source rock has been produced for the past 50 years, he noted. Producing Monterey Shale oil play as a resource rock is a trickier business.

"It's not a simple problem," he said. "If it was simple, we would have seen it by now."

Aminzadeh identified challenges in several areas:

► Technology: "We're still improving on the technology we need," he said.

► Characterization: "Positioning your wellhead in the Monterey Shale is very important."

► Regulation: "A potential issue is environmental considerations, including those in connection with hydraulic fracturing."

► Geophysics: "You are going to need a lot more development in three-component seismic analysis and shear wave technology, both from technical and economic view points."

And much more seismic work will be done in California in the coming years, Aminzadeh believes.

"I predict you will see an order of magnitude change in seismic acquisition, not only for the Monterey Shale, but also for the deeper targets we are looking at," he said.

In his description, development of Monterey Shale oil production begins to sound like the history of development of the Barnett Shale.

Aminzadeh himself has used the Barnett comparison.

"The Barnett Shale took 15 years to develop," he said. "It's not unusual in shale plays for things to take so long."

California from page 10

In 2006, Venoco began leasing onshore acreage targeting the Monterey shale, and it followed up with an active drilling program starting in 2010. Through the first half of 2012, the company has spud 28 Monterey wells and set casing on 25 of them.

Even though Venoco hasn't seen material levels of production or reserves from the program, it claimed to be "encouraged by the scientific information collected thus far," particularly in the Sevier Field in the San Joaquin Basin and the South Salinas Field in the Salinas Valley.

Development of the Monterey Shale probably will follow the same pattern as most other shale plays in the United States, Clarke predicted. Sooner or later, one company will figure out the right approach to drilling, hydrofracturing and production.

"This is a very expensive, risky project. There are a lot of places it can get knocked down," he warned.

Clarke noted that the L.A. Basin/Long Beach/Southern California oil fields region is acre-by-acre the world's most productive oil area.

He said getting even more out of the Monterey Shale would be "fantastic."

THE MAPS STILL AREN'T READY?

THE JV MEETING IS TOMORROW. YOU SHOULD BE DONE TUNING THE GEOLOGICAL MODEL BY NOW!!

WE NEED A BETTER SOLUTION. TOO MUCH TIME IS SPENT INTEGRATING DATA TO MAKE ONE MAP.

PETROSYS CAN USE ALL SOURCES TO CREATE EXCEPTIONAL MAPS AND MODELS IN A FRACTION OF THE TIME.

TRUE! AND WE CAN EVEN MAKE CHANGES DURING THE JV MEETING...

LET'S CALL PETROSYS TODAY!

BY GENERATING ACCURATE MAPS AND MODELS, COMBINED WITH SECURE DATA MANAGEMENT SOLUTIONS, BETTER DECISIONS ARE INEVITABLE. FIND OUT MORE AT WWW.PETROSYS.COM. AU/STAYTUNED

PETROSYS



Integrate and Visualize

Bell's patented data processing methodologies, inversion capabilities and synergy with other technologies fast track the exploration workflow.



BellGeospace

World leaders in Gravity Gradiometry

www.bellgeo.com sales@bellgeo.com

Technology competition escalates

Permian Basin Getting the Node Treatment

By LOUISE S. DURHAM, EXPLORER Correspondent

Plays are hot. Then they're not. Often, all it takes to jumpstart them once again is some new technology along with a passel of geoscience smarts – and favorable commodity prices.

The hydrocarbon-rich Permian Basin in West Texas and New Mexico is a sterling example of boom, bust and then boom again.

There's much ado about horizontal drilling, hydraulic fracturing, and other new techniques triggering the U.S. shale drilling frenzy, improving production in mature fields, and more.

Truth be told, seismic technology often plays a significant role, perhaps deserving a more prominent position in the spotlight.

Certainly, the Permian Basin, with its intense rejuvenation activity, is one of many regions in a position to benefit from advanced seismic technology.

Its basically rugged, inhospitable terrain ranges from flat to sometimes nearly vertical, and it is populated by any number of cable-gnawing creatures, both large and small. It's not the ideal environment for ordinary seismic data acquisition systems strung together by heavy high-maintenance cables, which are infamous for troubleshooting issues, and other problems.

Here, as in many areas around the world, the data gatherers and their oil company clients are taking steps to



Photos courtesy of Global Geophysical Services

Blending in: GGS is using more than 28,000 high definition nodes to efficiently record the Permian Basin subsurface.

transition to the newest land systems technology generally known as nodes.

Whether dubbed cableless, wireless, cable-free or whatever, these systems include FairfieldNodal's ZLand® system and its transition zone shallow water counterpart Z700, INOVA HAWK®, Sercel UNITE, OYO GSR, among others.

As one would expect from any arena where companies are battling for exploration advantages, the technology competition continues to escalate.

A New Kid in Town

The newest arrival in the autonomous land node systems milieu is Global Geophysical Services' (GGS) Autoseis® High Definition Recorder (HDR) developed by its wholly owned subsidiary Autoseis Inc.

The HDR has been used successfully since early 2011 in varying environments and far flung geographic locales, including the Amazon and the Arctic. Its first commercial program commenced in July 2011. A marine version is scheduled to make a commercial debut soon.

"The simple, totally scalable Autoseis HDR has no interconnecting cables and no complex radio links to or between the nodes," said Tom Fleure, VP of geophysical technology at GGS. "And it's the only system on the market today

See **Nodes**, page 16

COLLABORATIVE GEOPHYSICS

ENRICHED

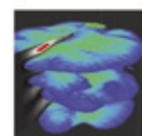
A New Shale Resource Perspective with Full Azimuth Imaging and Interpretation



MAKING SURFACE SEISMIC DATA MORE RELEVANT FOR SHALE RESOURCE PLAYS

Paradigm has introduced a breakthrough in the imaging, characterization, and interpretation of shale resource plays. EarthStudy 360® delivers full azimuth images of the surface in depth and in-situ, enabling a full characterization of stresses, fractures, and sweet spots without any approximations or shortcuts. With EarthStudy 360, the full geoscience community wins with new collaborative perspectives and insights.

Get **enriched** results. Find out how at pdgm.com.

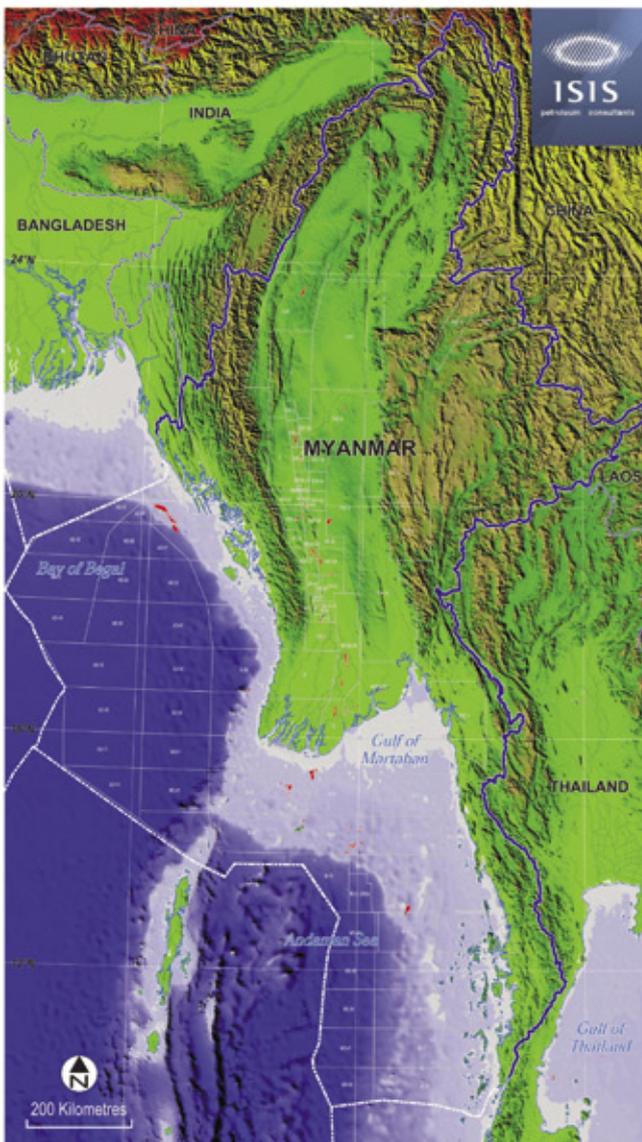


A full azimuth angle gather from the Barnett Shale visualized in 3D

Paradigm®

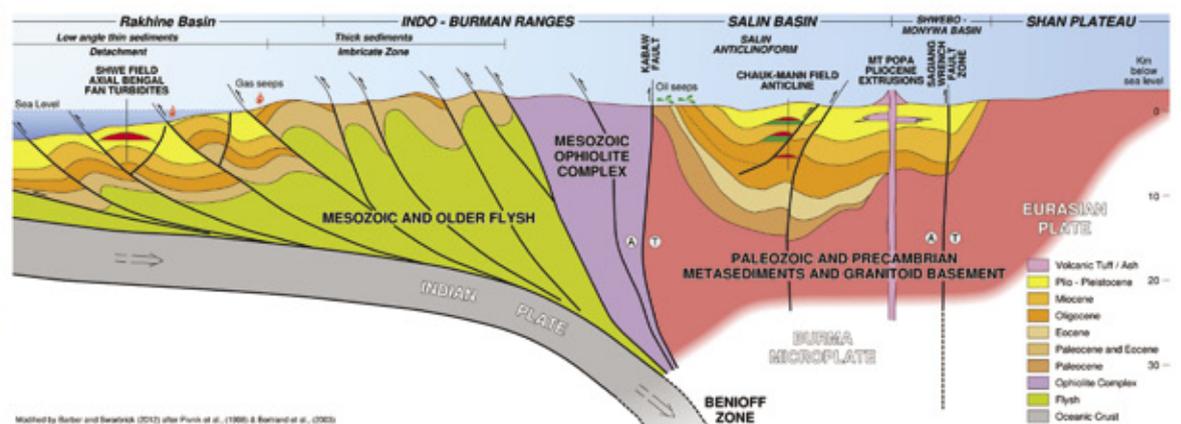
Myanmar

Multi-Client Regional Prospectivity Study



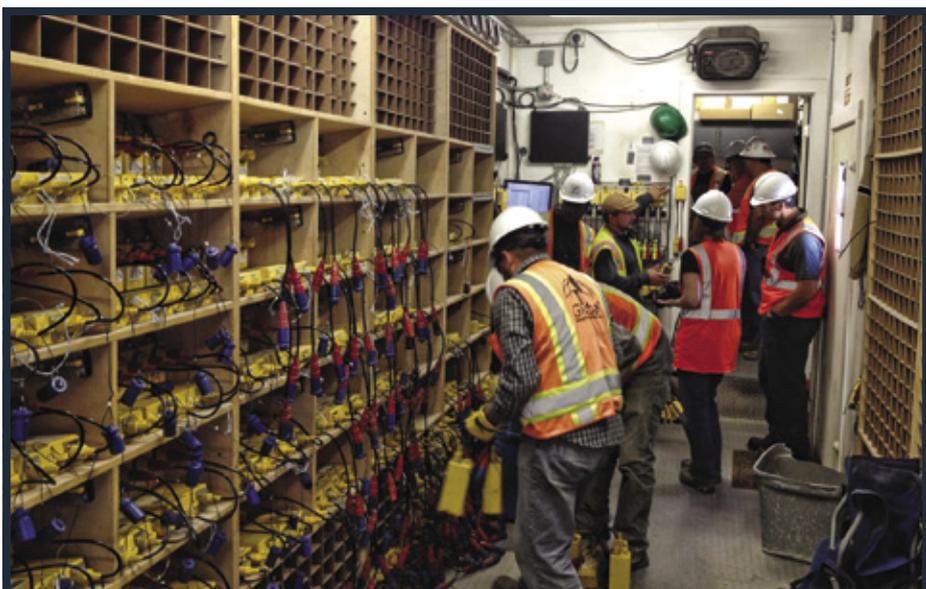
The Myanmar Prospectivity Study

- The Myanmar Multi-client Regional Prospectivity Study is a joint venture project between Searcher Seismic and ISIS that will integrate the geology, basin analysis, hydrocarbon habitat, petroleum systems and play fairway trends of Myanmar. The study will help assess the hydrocarbon potential of the Myanmar region.
- ISIS has extensive knowledge of Myanmar having worked in and around the basins of the region for 10 years across a multitude of different projects. Combining ISIS' deep knowledge with Searcher's multi-client expertise will enable the joint venture to produce a quality report that will help companies interested in entering the Myanmar region to explore for oil and gas.
- Key content will include analysis of chronostratigraphic and paleographic evolution, key petroleum systems, exploration potential and critical exploration success factors.
- The principal focus basins are the Central Burma, Offshore Rakhine, Offshore Irrawaddy Delta and Deepwater Mergui Basins.



P: +61 8 9327 0300 E: sales@searcherseismic.com W: searcherseismic.com





The work day begins: GGS has six fleets and 120 crew members for its Permian operations.

Nodes from page 14

that records double precision, true 32-bit seismic data.

"We have deployed more than 100,000 HDR-1C units, principally in heavily wooded areas, jungles, swamp environments or mountainous areas," Fleure said. "These are locales where terrain, weather and other elements of nature typically challenge the large equipment and crews ordinarily needed to acquire high-quality seismic data.

"In our first year using Autoseis HDR units, we increased our average production rate by 2.3 times over our cable systems, with projects repeatedly coming in under budget," Fleure added.

This powerful node looks deceptively

simple with a lightweight plastic case measuring approximately 2.5 by 3.5 by 0.5 inches. Pop open the case, and the see-through inner pack with the brains tells you this is far-out technology.

A couple of rubberized links, attached to the outer case, terminate in small tube-like gizmos. These are the connectors for the battery and for the receiver group, ordinarily a geophone string.

Each receiver station is attached to a station stake, where they remain unattended until recording is complete. Each HDR provides an independent GPS measurement of its location during recording, which can be used to verify its actual placement.

Near and far trace offsets are easily manipulated, given that channels can be added or subtracted without changing anything in the field if the receivers are deployed.

Once the data are collected, the nodes are retrieved and taken to a specially equipped field trailer. There, the data are downloaded and the batteries recharged prior to redeployment.

With 12-hour/day recording, battery life is 40 days vs. 20 days for 24-hour/day recording.

In line with other available nodal, or wireless systems, Autoseis provides:

- ▶ Flexible acquisition geometries.
- ▶ Reduced downtime and maintenance.
- ▶ Increased productivity.
- ▶ Improved health, safety and environmental (HSE) conditions.
- ▶ Enhanced access to challenging locales.

Without the potential for cumbersome cables strung out here, there and everywhere, permitting tends to become a bit less trying (read: less expensive and less time-consuming).

Plus, landowners tend to be a happier lot, for the most part.

Handling Complex Geology

Given that the Permian Basin is such a hot spot and has so much potential for the future, GGS zeroed in on the opportunity to work a multi-client survey using Autoseis. The project's focus is the Ozona Arch, specifically Reagan, Crockett and Upton counties in the southern reach of the Midland Basin.

Dubbed the University Lands Project, phase 1 of the high resolution RG3D® Reservoir Grade 3-D survey will cover 355 square miles, which harbor a number of different target horizons.

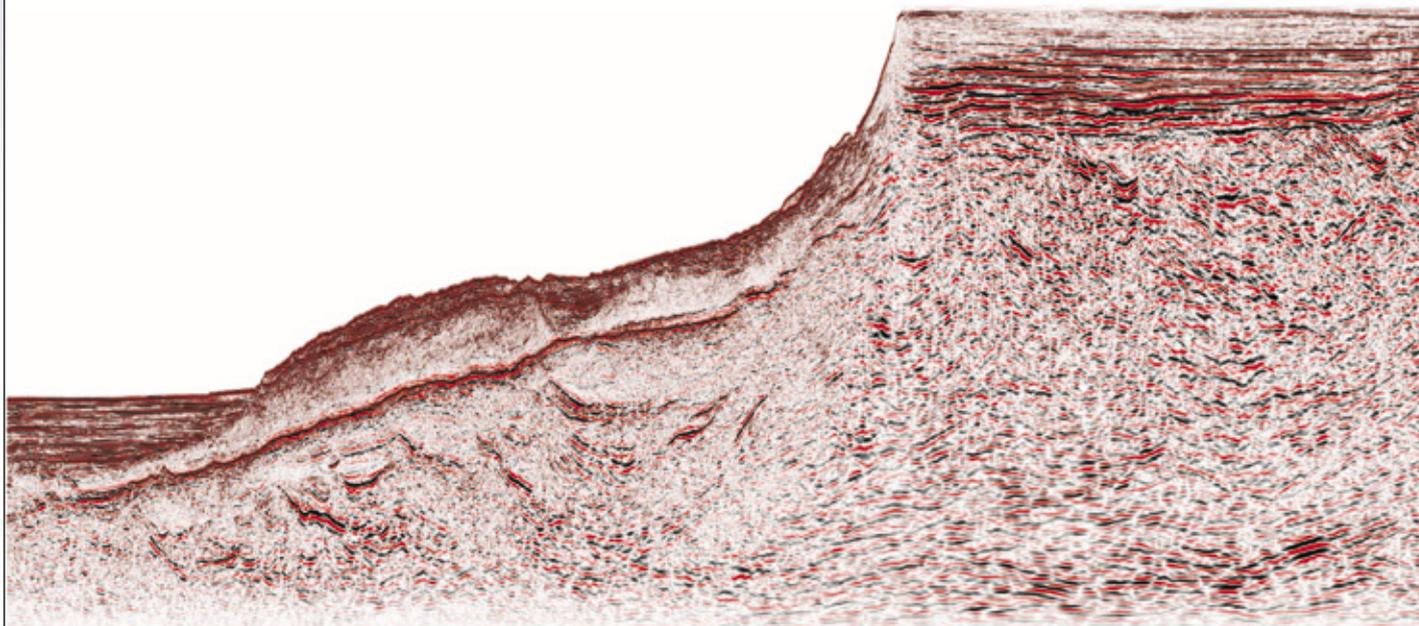
The likely completion date was expected to be late October; kickoff times for phases 2 and 3 will depend on underwriting availability.

The Ozona Arch exhibits a variety of terrain types, with some areas being excessively steep. To avoid having the vibrator source trucks constantly navigating such difficult areas and to eliminate excessive driving time, some fleets are positioned at the high elevations while others are bottom dwellers, so to speak.

The receiver stations for the survey are laid out in lines, although the flexibility of the system allows for any surface geometry configuration. The stations are positioned 55 feet apart.

"We have six fleets in the Permian with two vibrators for each fleet and are using offset separated source fleets and slip sweep vibroseis technology to optimize crew productivity," said AAPG member Duncan Riley, GGS' VP-North

WHEN CAPABILITY COUNTS...



...COUNT ON FUGRO



Fugro and Geomahakarsa have recently acquired and processed ~19,600 km of non-exclusive 2D seismic data in the Seychelles.

- Geologically attractive area
- Unequivocal evidence of active petroleum systems
- Geological prospectivity related to rapidly emerging plays in East Africa & established plays in Western India
- 8 km streamer, 7 second records
- Shot point interval of 18.75 m
- Potential field data
- Regional integrated interpretation

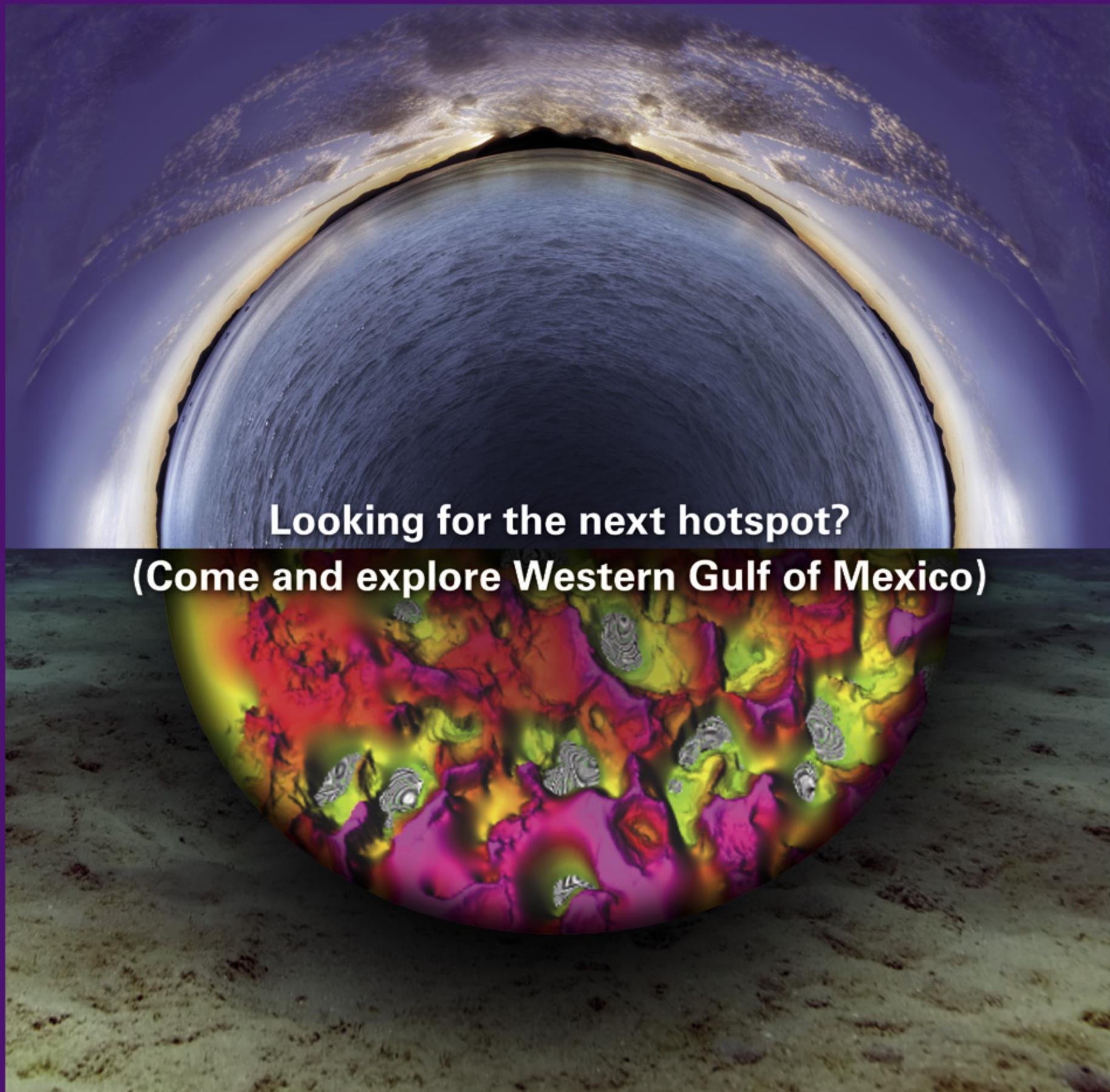


Fugro Multi Client Services

Ewa Ginal
Mob: +61 467 721 189
Email: e.ginal@fugro.com
www.fugromulticlient.com



See Permian, page 18



**Looking for the next hotspot?
(Come and explore Western Gulf of Mexico)**

MultiClient GULF OF MEXICO

Revealing and de-risking hotspots starts here

Lease Sale #229 in the Western Gulf of Mexico, the industry's next big frontier, is open. PGS data and experts can offer new geological insights into simplifying your path to success in this frontier territory. Gain the perspective that can lead to new prospects, and make Western Gulf of Mexico a key part of your portfolio.

Supporting your exploration success

A Clearer Image
www.pgs.com



gominfo@pgs.com

Technological infusions help

Permian Basin Still 'Bustling' With Activity

By LOUISE S. DURHAM, EXPLORER Correspondent

The prolific and venerable Permian Basin is made up of an assortment of geological subdivisions. The U.S. Geological Survey breaks it down as Midland, Delaware, Pecos and Val Verde basins along with the Central Basin Platform, Ozona Arch and northwestern, northern and eastern shelves.

Overall, the Permian envelops an area about 260 miles wide and 300 miles long. This region is underlain in large part by thick deposits of mineral-rich sediment, creating one of the most productive oil regions in the world.

The USGS "Assessment of Undiscovered Oil and Gas Resources of the Permian Basin Province of West Texas and Southeast New Mexico 2007" report estimated a mean of 41 Tcf of undiscovered natural gas and a mean of 1.3 Bbls of undiscovered oil in the province. Undiscovered natural gas liquids tallied a mean of 1.0 Bbls.

The first commercial well discovery occurred at the Westbrook Field in Mitchell County in 1921. Soon thereafter, folks were scurrying to acquire leaseholds and drill in the basin.

The ensuing production peaked at two million b/d in the early 1970s.

Then, as oil prices spiraled downward, the major companies headed elsewhere to latch on to bigger opportunities. Operators with lesser economic demands hung on for the most part, and the rig count tallied a paltry 43 wells in 1999, indicating a death knell of sorts for a once-proud giant.

Fast-forward to today, and you'll see a region bustling with activity. Reported cumulative production of more than 30.4 billion barrels clearly is headed straight

up. Given that 2011 production reached 280 Bbo according to the Texas Railroad Commission.

A number of factors are responsible for this revitalization. Think natural gas prices low enough to make you cry and, no surprise, new technology.

This includes horizontal drilling and multi-stage hydraulic fracturing in both horizontal and vertical wells, which remain the technique-of-choice in certain locales.

Additionally, there are the old yet improved standbys, such as waterflooding and CO₂ injection, which have long been successfully applied in the basin's numerous reservoirs.

Perhaps the most intriguing happening is increased production via deeper drilling, which, in turn, has triggered some funky nomenclature.

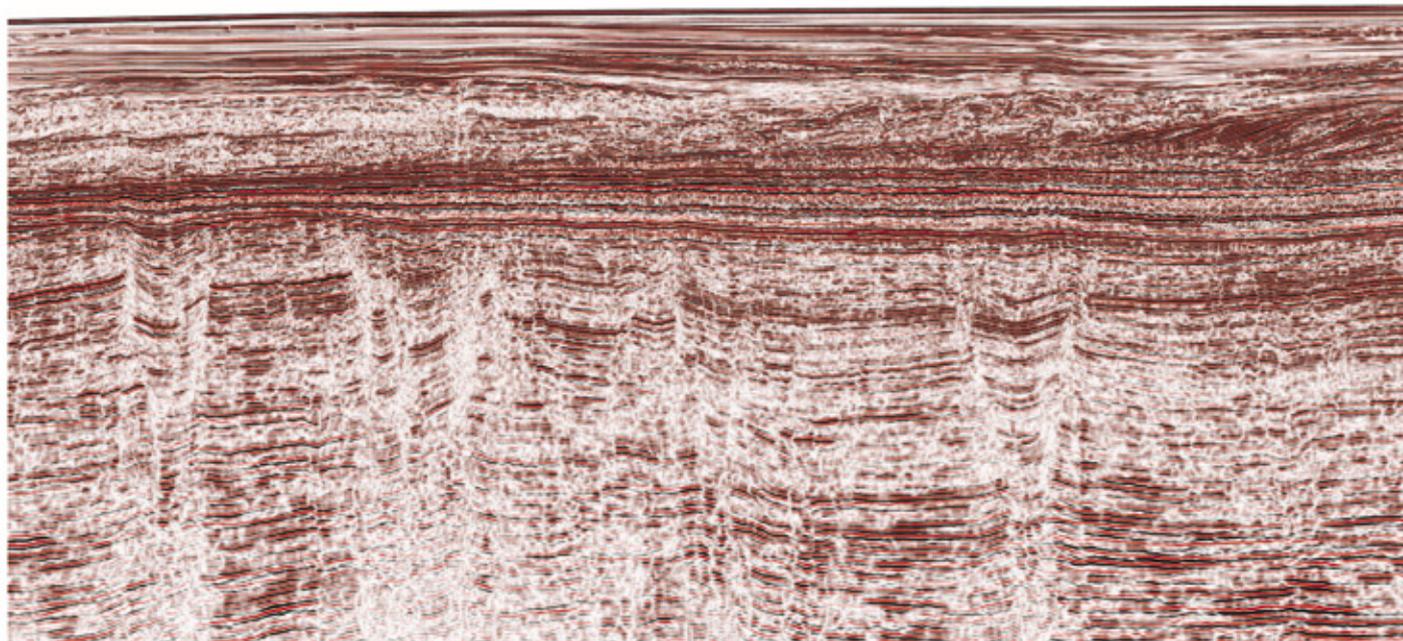
Given the current glut of natural gas produced in the United States, principally from the raft of shale gas fields, the oil-rich Permian is darned near irresistible.

Even the majors are setting up camp once again.

The most recent news is from Shell Oil and Chevron, which recently snapped up 618,000 and 246,000 acres, respectively, from Chesapeake Energy in the Delaware Basin – which itself holds a number of stacked oil and wet gas plays.

Chevron's purchase added to its existing 700,000-acre position in the basin. 

WHEN QUALITY COUNTS...



...COUNT ON FUGRO



Fugro has acquired and processed the Zeebries 3D (~3,800 km²) in the Carnarvon Basin on the North West Shelf.

The survey area is within Australia's premier hydrocarbon province and next to producing fields and existing infrastructure.

The Zeebries 3D aims to clearly define play levels in the area including the Triassic Mungaroo fault blocks to the south and the Jurassic-Triassic horsts and wrench-controlled troughs to the east.

Fugro Jason has commenced a full seismic inversion over the survey including lithology probability volumes which will aid in fast-tracking the interpretation process.

Fugro Multi Client Services

Owen Dyer
Mob: +61 413 607 363
Email: o.dyer@fugro.com
www.fugromulticlient.com



Permian from page 16

America. "We have 120 crew members managing 28,000 channels, or nodes.

"In combination, this receiver and source effort results in really phenomenal sampling and imaging of the complex geology," Riley noted.

"Compared to conventional 3-D surveys, which have a typical trace density of 350- to 450 thousand traces per square mile, the University Lands program boasts a trace density in excess of 4.3 million traces per square mile," he emphasized.

In step with a general trend in the industry to go nodal, the company is in the process of converting all of its land crews to Autoseis technology. A 3C version to record both P wave and shear wave data is nearly ready to be launched.

As the name Global suggests, president and CEO Richard Degner thinks big.

Degner, an AAPG member, envisions implementing complete, contiguous seismic coverage over the heart of the Permian Basin, i.e. Midland and Delaware basins and Central Basin Platform, versus the "postage stamp" approach of numerous yet discontinuous seismic surveys, which are the norm here and other places.

"I think," Degner said, undaunted by the prospect of such a challenge, "it could be done in maybe five years or so." 

TGS DATA DELIVERS THE WORLD



US \$1,000,000,000 invested in multi-client data over the past 3 years

Australia, Angola, The Bahamas, Benin, Brazil, Cameroon, Canada, Congo, Cote D'Ivoire, Cyprus, Denmark, Egypt, Faroe Islands, Gambia, Gabon, Germany, Ghana, Guinea, Guinea-Bissau, Greece, Greenland, Iceland, Indonesia, Ireland, Israel, Italy, Liberia, Libya, Madagascar, Malta, Namibia, Netherlands, Norway, Oman, Portugal, Russia, Senegal, Sierra Leone, Somalia, Tunisia, Togo, United Kingdom, United States and Vietnam



Learn more at WWW.TGS.COM

Partnership yields 'virtual IT system'

Seismic Technology Keeping GOM Active

By DAVID BROWN, EXPLORER Correspondent

Cobalt International Energy Inc. in Houston has built its Gulf of Mexico operations on geophysical expertise.

Not necessarily its own.

The continued improvement in seismic coming out of the Gulf hasn't been lost on AAPG member James H. Painter, Cobalt executive vice president and division manager for the Gulf of Mexico.

"I don't think we could be drilling in the subsalt without that improvement. And the people have gotten incredibly good," Painter noted.

"The issue for us working the subsalt is pretty much the quality of the seismic," he said.

So here is what Painter wants from seismic now:

Bigger.

Better.

More.

You might have to be a Gulf of Mexico exploration manager to look at today's processing speeds and say, "Faster!"

A Few Dollars More

Painter has watched offshore geophysics move forward with the introduction of wide-azimuth and multi-azimuth seismic. He foresees new advances in "a combo of acquisition and processing" that will take seismic imaging to new levels.

"What they're talking about now is



PAINTER

For Cobalt, the Gulf remains a prime play area: "If there's another challenge, it's seeing if we can keep the talent pool working, and growing the talent."

either full azimuth or coil, and hundreds of times more data," he said.

In coil acquisition, marine seismic data is captured by a vessel moving in a series of overlapping, continuously linked circles. Dual coil involves two recording vessels and two separate source vessels sailing in interlinked circles.

Advantages of the technique are very high fold seismic, improved signal-to-noise ratio and better detection and imaging of weak subsalt reflections.

Cobalt International maintains an unusual relationship with Landmark Graphics, creating what it calls "a virtual IT system with state-of-the-art subsurface interpretation and volume visualization capabilities."

Landmark provides all of the company's seismic data storage and geophysical software hosting services.

"We did something fairly unique when we started Cobalt," Painter said. "Our business model from Day One was to

outsource everything that wasn't directly related to exploration and production."

Geophysicists can access, work with and interpret the company's seismic data from anywhere and at any point – even communicating by telephone to work in teams.

Painter acknowledged that he has systems in place to protect against data theft or disruption, and added that he loses absolutely no sleep worrying about the safety of the distributed approach.

In the Gulf of Mexico, Cobalt says it has licenses covering about 18.3 million acres (74,000 square kilometers) of processed, 3-D, depth-migrated seismic data, and about 2.8 million acres (11,400 square kilometers) of wide-azimuth, 3-D depth data.

It has performed proprietary reprocessing on about 4.3 million acres (17,600 square kilometers) of the 3-D data and has also licensed about 78,000

line miles of 2-D, pre-stack, depth-migrated seismic in the Gulf.

"The base data set is almost entirely speculative" in the Gulf of Mexico, Painter noted.

"What almost every operator does is to take that base data and then do additional processing," he said, "and that becomes proprietary."

The scope, challenge and cost of drilling in the Gulf justify Cobalt's spending on advanced seismic operations, according to Painter.

"In the old days we were drilling \$50 million or \$60 million wells. In the current environment, we're spending north of \$150 million," he said.

At that level of expense, Painter observed, it makes sense to spend "a few more dollars" on enhanced geophysical capabilities.

An Exploration Magnet

Partly because speculative seismic in the Gulf of Mexico is so plentiful and readily available, and also because of existing infrastructure, the Gulf has become an exploration magnet for operators and companies from around the world.

Both the "opportunity is there and the data quality is there," Painter said. "The

See GOM, page 22

INNOVATIVE DATA POOL PROGRAMS

ECHO GEOPHYSICAL CORPORATION SINCE 1986



Proprietary ECHO Data Pool Programs

3-D ECHO Program
3-D Gulf Coast
3-D Permian Basin
3-D Rocky Mountain
Eagle Ford/Vicksburg Trends
Fort Worth Basin
High Plains Oil Play
Marcellus Shale/Appalachian Region
Maverick/Val Verde
Mid-Continent
SeisMix California
State of Kansas
West Texas SeisTrade
Total Square Miles: 11,260.81

2-D ECHO Program
2-D Greater Permian Basin
2-D Maverick-Val Verde Basin
2-D Mid-Continent
2-D SeisMix California
2-D West Texas SeisTrade
2-D Nevada Basin & Range
Total Line Miles: 8,079.84

FUELING ENERGY EXPLORATION SINCE 1986

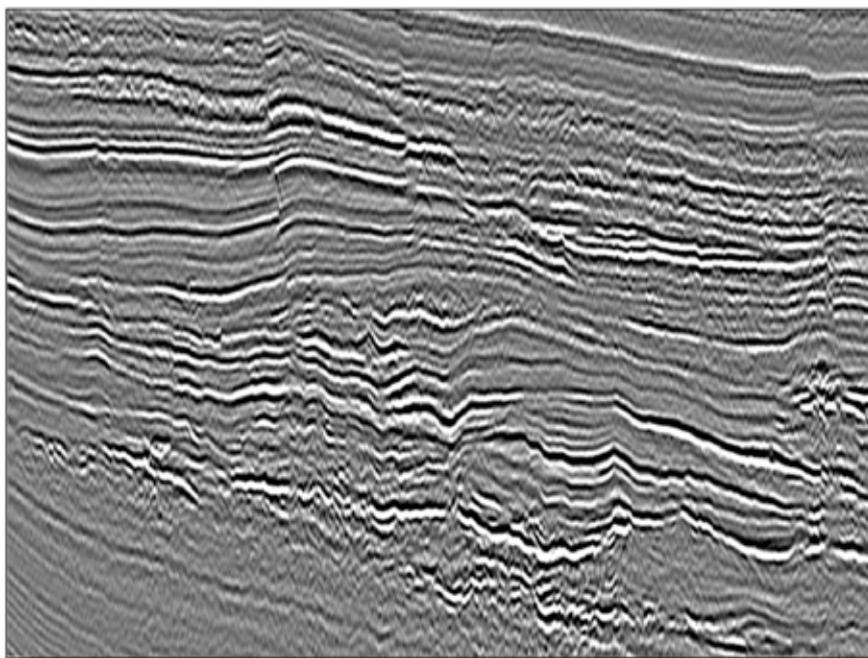
Since its formation in 1986 by a group of seismic exploration experts, ECHO Geophysical Corporation has provided the seismic data and processing services that fuel the success of the oil and gas industry.

Along the way, we have pioneered innovative seismic data acquisition and processing models that have revolutionized the exploration process.

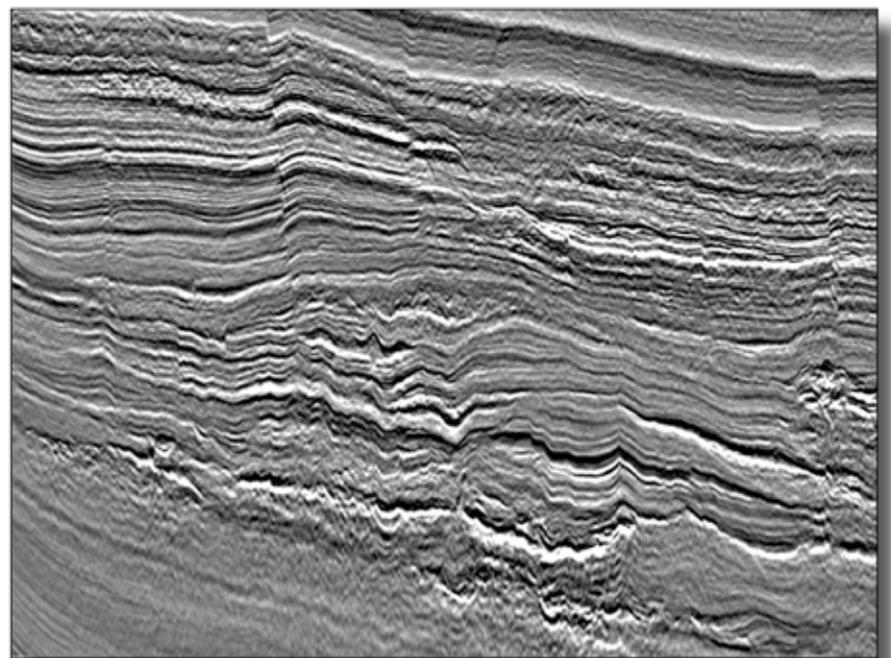


DENVER - 303.893.9014 | HOUSTON - 281.748.6278 | WWW.ECHOGEO.COM

GX Technology's WiBand™ – The broad bandwidth answer for conventional streamer data.



Conventional Processing



WiBand Processing

The example above compares images from the same 2D dataset using conventional processing versus WiBand. The WiBand image has much higher resolution due to its increased frequency content on both the low and high ends of the spectrum and the fill-in of the ghost notches. The streamer was towed at 15 meters in this example. (Data courtesy of Polarcus and Ophir.)

PROCESSING CENTERS: HOUSTON, DENVER, CALGARY, LONDON, RIO DE JANEIRO, CAIRO, PORT HARCOURT, LUANDA, MOSCOW, PORT OF SPAIN, BEIJING, AND DELHI (GURGAON)

Source and receiver related notches in the frequency spectrum resulting from free surface reflections have traditionally limited resolution in the marine environment. GXT's WiBand processing technology lets you recover the full spectrum in data acquired using conventional towed streamers, thus delivering superior high resolution images. To learn more, visit iongeo.com/WiBand.

- AREAS OF EXPERTISE
- Unconventional Reservoirs
 - Challenging Environments
 - **Complex Geologies**
 - Basin Exploration
 - Reservoir Exploitation



GX TECHNOLOGY

KNOWLEDGE

Revealed.

- Unrivaled land seismic acquisition capabilities with specific solutions for all terrains and environments
- Full azimuth 3D and 3C coverage in unconventional resource plays
- Multi-Client opportunities
- Proven experience in:
 - Azimuthal anisotropy resolution and fracture identification
 - Multicomponent processing
 - AVO processing and inversion



P-wave

PS-wave

Data: Geophysica Pursuit & Geokinetics



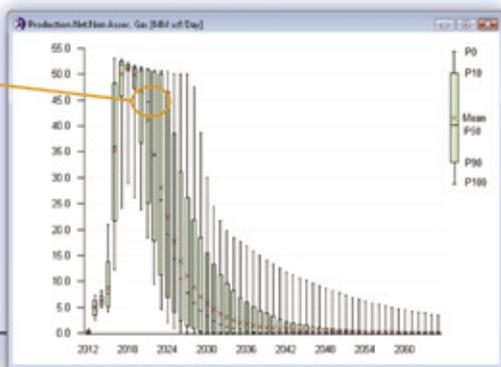
GEOKINETICS.COM

Considering a shale oil or shale gas resource play?

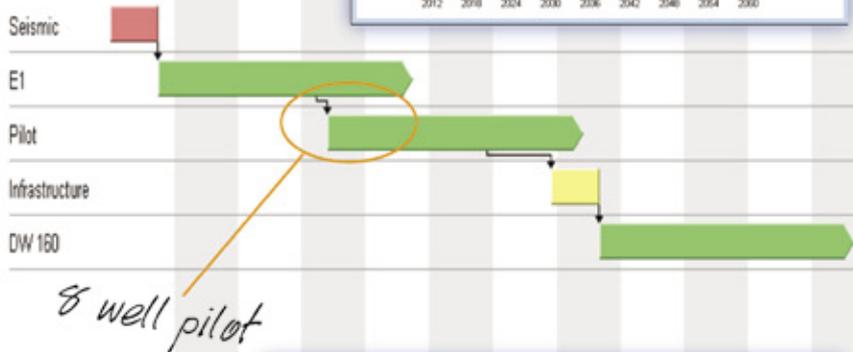
Do Activity-Based Value Assessment

Using **GeoX**

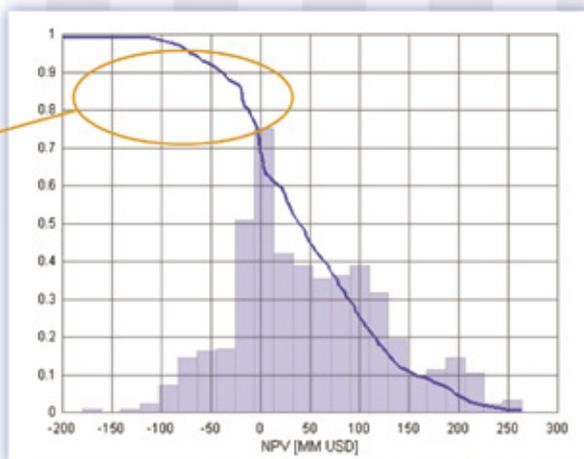
Only 50% chance of achieving production goals in 2020



Activities January 1, 2012, 2013, 2014, 2015



73% chance of commercial development



See what **GeoX** can do for you:

- Play and prospect assessment tools
- Conventional and Unconventional Resources
- Risks, resources, production and economic value
- Global fiscal library
- Integrated with ArcGIS for map-based assessment
- Shared secure database
- Concepts and application schools and courses

GeoKnowledge

Making knowledge work

www.geoknowledge.com



A Tomographic Fracture Image™ in the Eagle Ford, showing an oblique view of the wellbore with microseism hypocenters (blue dots) and one-voxel-thick slice of the image at the wellbore.

Mapping fracture networks

Tomography a Hit

By LOUISE S. DURHAM, EXPLORER Correspondent

For the most part, the proverbial “man on the street” tends to think of hi-tech as being synonymous with the latest pop culture electronic gizmos.

The fact that the oil and gas industry overall is essentially the epitome of hi-tech just isn’t on the radar screen of the general populace.

But it should be: One of the latest esoteric developments in the seismic sector of the industry is Tomographic Fracture Imaging (TFI).

The newly available, patented TFI technology originated at STRM LLC, which was acquired by Global Microseismic Services (GMS), a subsidiary of Global Geophysical Services.

“We have been validating this technology for many years, including analysis over unconventional resource plays,” noted STRM founder and AAPG member Peter Geiser, chief technologist for tomography-based natural fracture imaging at GMS.

Simply speaking, the technology is a passive-microseismic surface-based array method for imaging both natural and induced fractures on a reservoir scale. TFI delivers detailed images of the fracture networks in reservoirs via tomographic analysis of energy emitted from subsurface activity such as hydraulic fracturing, hydrocarbon production or the natural background seismicity of the earth.

TFI directly images the fracture flow paths in the reservoir as complex surfaces, which is orders of magnitude beyond the current, familiar industry standard of dots-in-a-box display during fracture monitoring.

The new technology utilizes a novel approach to Seismic Emission Tomography (SET) in combo with empirical data on fracture geometry. SET is a technique for imaging sources of seismic energy contained within the volume being imaged.

The seismic energy is recorded by a surface or near-surface receiver array. The collected data are processed to provide a 3-D grid of voxels, or 3-D pixels, with node points at the body center of each voxel cube.

The TFI method looks at cumulative signals from each voxel over time rather

than attempting to single out individual microseismic events.

Confidence Building

In addition to direct mapping of fracture/fault networks, the technology provides a more confident representation of reservoir connectivity than traditional microseismic techniques.

Another advantage is the ability to I.D. fracture propagation rates.

When tomographic images are time sequenced, they can illustrate the rate of energy propagation away from the wellbore.

In other words, data gathering in time enables the interpreters to see movement of acoustic energy in the reservoir. Independent data show these pathways to be permeability corridors.

The reservoir permeability field can be mapped via the summary of natural and induced responses to changes in reservoir pressures presented by the TFI data.

The time-sequenced images of TFI have the capability to show:

- ▶ Rate of hydraulic fracture propagation.
- ▶ Dynamic features of the fracture interaction with the rock.
- ▶ Movement of pressure responses away from the hydraulic fracture.
- ▶ Reservoir rock response to these pressure changes (such responses show the likely optimal production horizons).

Nailing reservoir boundaries is of prime importance to geoscientists and others, and TFI can be used to image the lateral and vertical connection – or isolation – of the hydraulic fracture energy. Acquiring information that this energy impacted only the reservoir rock and nothing else of significance, such as, an overlying aquifer, is undeniably a good thing.

Advanced information about geological events that can affect drilling decisions is invaluable to help ensure a smooth running drilling operation. Geiser says TFI has the capacity to:

- ▶ Recognize the in situ stress regime.
- ▶ Predict the presence of active fault/fracture networks ahead of the drill bit.
- ▶ Identify a reservoir’s most productive areas.



The future is shale. The future is BHP Billiton.

"BHP Billiton Petroleum is all about expanding our horizons onshore and offshore. We are now positioned to lead the oil and gas industry in shale production."

Christina Huenink, Exploration Planning Analyst

BHP Billiton is exactly where I want to be.

BHP Billiton Petroleum is one of the largest independent oil and gas companies in the industry, with exploration, development and production activities worldwide. We have the financial resources of a super major, which enables us to work on projects with the latest technology anywhere in the world.

Join our team jobs.bhpbilliton.com

Challenging conditions overcome

Ice No Longer Ices Seismic Acquisition Crews

By LOUISE S. DURHAM, EXPLORER Correspondent

The Arctic holds an estimated 25 percent of the world's undiscovered hydrocarbon resources, making the cold, largely barren region a hot target for the E&P industry.

It's not an easy target, for a number of reasons.

The most obvious one is the frigid climate.

Snow and ice accumulations pose problems for people and equipment alike, particularly the seismic data gatherers who need to work offshore in ice-capped waters.

But frigid conditions don't tell the whole story.

ION Geophysical first began acquiring modern seismic data near the ice in 2006, using traditional open water methodology working in the Canadian Beaufort Sea and the U.S. Chukchi Sea. Additional programs followed in 2007 and 2009, during the usual open water season of August and September, in general.

"With traditional acquisition we were at the mercy of the ice and the limited operating window and geography it imposed. We knew we'd have to actually work in the ice to more effectively evaluate the prospectivity of the area," said Shawn Rice, vice president of operations for GeoVentures at Ion.

"We conducted our first commercial under-ice acquisition in the summer of 2009 off the northeast coast of Greenland," Rice noted. "It was



Photos courtesy of ION Geophysical

The seismic vessel Geo Explorer acquiring data behind the icebreaker boat Oden.

considered a success with just over 5,200 kilometers of long-offset, high-quality 2-D seismic data acquired without incident to crew or the environment, and only 2 percent technical downtime."

Real Time

It took considerable planning and effort to accomplish this.

A diverse project team was assembled, comprising individuals with varying expertise, such as marine seismic operations experts, geophysicists, vessel captains and ice pilots – as well as engineers. These experts came together to customize the technology and optimize all aspects of the workflow.

"The team determined that operations would best be conducted by two vessels: an ice-class seismic vessel and an Arctic-class icebreaker," Rice said. "The icebreaker opens a fairway in the ice for the seismic vessel to safely operate."

Although traditional ice-breaking practices allow the trailing vessel to stop and wait for the icebreaker to clear a path, this can't be done when towing a seismic streamer because of potential damage to the in-water equipment. Advanced planning and constant communication and cooperation between the vessels' senior maritime crew were critical to the

See **Under the Ice**, page 28

You're ready. Is your LAS data?

- Spending too much time on LAS file cleaning?
- Rather be spending more time evaluating data rather than fixing it?
- Are your current LAS data cleaning methods limiting you?

If any of this sounds familiar, get LAS WORX working for you. It's easy-to-use — be up and running in minutes, quickly cleaning your LAS data, one file or hundreds at a time.

Try **LAS WORX** free for one month.

Email us at customer@nrgx.ca for download instructions.

LAS WORX Clean module, the first of a family of log products — Store and Share modules coming soon

You'll like its data gathering, batch processing, automatic file structure repair and optimization, optional curve units and curve mnemonics aliasing, results reporting, interactive file viewing and editing features, and more.

NRGX
Technologies Ltd.

nrgx.ca • Tel: 403-875-9680



At Chevron, you'll join a team with the technology to take on big challenges, the integrity to do it responsibly, and the drive to keep the world moving forward. Are you up to the job?

Chevron is seeking qualified applicants for geoscience positions in the U.S. and around the world.

To learn about specific positions and locations, please visit us online at chevron.com/careers

JOIN THE CHALLENGE.

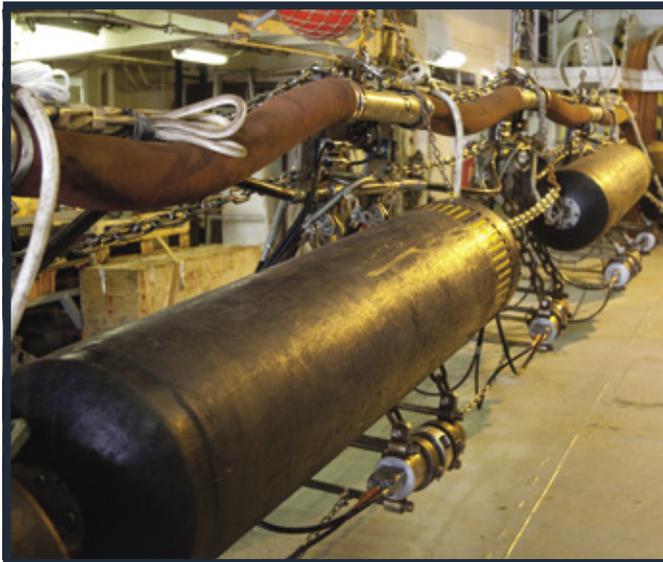


Human Energy®

An equal opportunity employer that values diversity and fosters a culture of inclusion. CHEVRON, the CHEVRON Hallmark and HUMAN ENERGY are registered trademarks of Chevron Intellectual Property LLC. © 2011 Chevron U.S.A. Inc. All rights reserved.



Cold climes, hot action: The MV Geo Explorer at work in the Arctic ice.



Source floats allow seismic sources to be towed at a specific depth under the Arctic ice.

Under the Ice from page 26

operational success, according to Rice. An integrated technology and communications protocol was established that allowed the vessels to share views and images from both bridges to manage vessel actions in real time and to plan movements days and weeks in advance based on ice scenarios. "To improve real time positioning for the start of line, the navigation system considered the set and drift of the ice and the position and speed of the icebreaker relative to the seismic vessel," Rice said. "This allowed the crew to break an offset track in the ice, enabling the seismic vessel and streamer to be in position over the pre-plotted seismic line when they reached it."

More Time to Work

Under-ice deployment negated the use of all surface-referenced equipment because the ice could damage equipment and compromise data quality. As a result, ION developed a number of custom under-ice technologies. First and foremost, ION needed to deploy and tow streamer and source systems through the ice without damaging them.

An ice "skeg" was developed as a protective channel and submerged tow point for the streamer lead-in and source umbilicals to travel from the vessel to a position below the ice to ensure uneventful towing.

In addition, submerged floats allowed seismic sources to be towed at a specific depth under the ice.

Lastly, underwater tail buoys were developed to provide GPS positioning in open water.

Arctic seismic programs often introduce unique noises. Ice multiples and sounds generated from the icebreaker or ice collisions with the vessel(s) all have the potential to contaminate the seismic records.

The DigiSTREAMER™, the acquisition system used on the project, continuously recorded data to capture all these noises for proper removal from the desired earth response during processing.

"We can now significantly extend the traditional working seasons in the Arctic," Rice noted. "In the Beaufort Sea, for example, the traditional working season in open waters is principally August and September. With this technology, we now have the ability to almost triple operating time, from the mid-July to December time frame."

Environmental Concerns

A caveat: It's not just about the technology.

Besides the usual array of regulatory permits, the authorities must authorize work during non-traditional time frames.

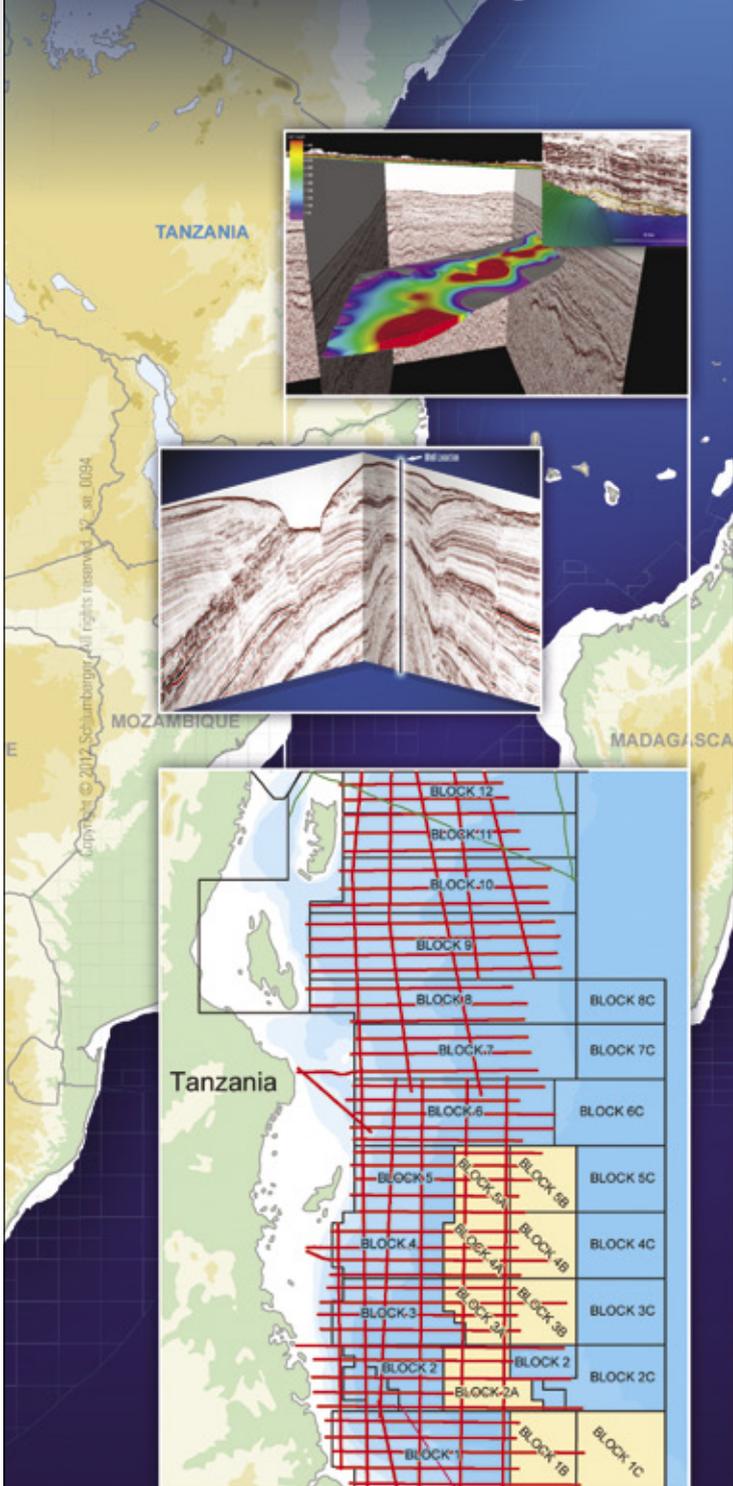
At press time, ION was awaiting approval for seismic operations to kick off in mid-October and likely continue into December, depending on ice conditions.

One of the big concerns in the Beaufort Sea is environmental protection of the whales and to ensure that the whalers can maintain their lifestyle and line of work.

"We must be careful to not interfere with the whale migration and also not interfere

See Arctic Seismic, page 30

Tanzania Reprocessed 2D Seismic Surveys



Multiclient Services

Reprocessed Data Offers Increased Resolution and Improved Imaging

WesternGeco, on behalf of the government of the United Republic of Tanzania through the Tanzania Petroleum Development Corporation (TPDC), has recently completed reprocessing of 11,000 km of 2D prestack depth migrated data from Tanzania Blocks 1 to 12.

These newly interpreted data from blocks in depths of up to 3,500 m are available now, in time for the fourth Tanzania offshore licensing round.

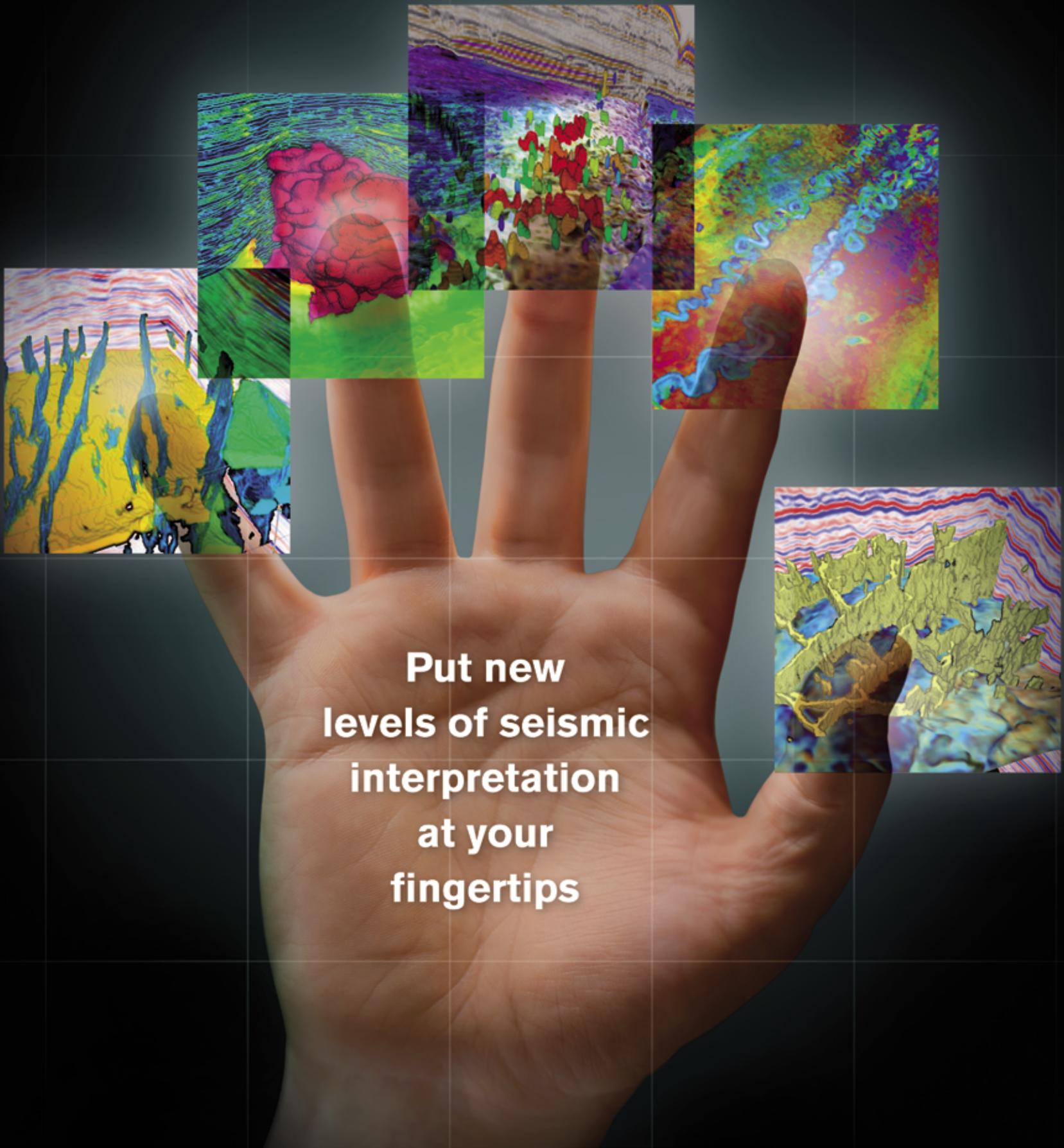
Key highlights

- 2D anisotropic Kirchhoff prestack time migration
- 2D anisotropic Kirchhoff prestack depth migration
- AVO and inversion-ready seismic gathers

For more information, please contact
+44 (0)1293 556533

www.slb.com/multiclient





**Put new
levels of seismic
interpretation
at your
fingertips**

With GeoTeric™, you can extract accurate, multi-layered subsurface information from seismic data in days, not weeks.

By directly translating geophysical data into geological information, you can fully explore and interact with the geological expressions within your data, cutting substantial time from your interpretation workflow.

Uncover the full potential of your seismic data and evaluate reservoirs with greater confidence, powering the most informed, seismically driven decisions you've ever made.

Get in touch now: email power-on@GeoTeric.com or visit www.GeoTeric.com

poweron with GeoTeric



Arctic Seismic from page 28

with the whalers' traditions and rights," Rice said. "By us using this technology to operate outside of traditional open water seasons, ION can acquire data when the majority of the whales have migrated out of the area and completely avoid impact to the whales or the fishing industry.

"Whaling can start as early as August and traditionally runs through September or mid-October," he said. "When we get ready to start, the season should be complete.

"One of the unique advantages ION provides in its multi-client data is connecting vast basins to better evaluate prospectivity," he added. "We have acquired data in the Canadian Beaufort and the U.S. Chukchi Sea, and part of this current effort will be an attempt to connect those so we can get a



High-tech ice navigation systems make Arctic exploration a bit easier – and more efficient.

contiguous profile."

The ability to extend the seismic acquisition season with under-ice technology and eliminate impact to whale migration and hunting is a significant mitigation measure.

Even so, permits of any kind are a challenge in this region, according to Rice. There are many regulatory hurdles, which require considerable time and effort.

The companies work not only with the regulators but also the communities. Trust and relationship building plays a big role. ION said that its representatives travel to various towns and villages and meet with community leaders and whaling captains to help all parties to better understand one another and mitigate potential issues in advance.

"A lot is asked of us, and we must comply," Rice noted. "This includes having marine mammal observers on boats, who have the authority to shut us down if they sight a marine mammal in the area.

"Because the visibility isn't very good, they even use infra-red radar to actually spot the heat source from the animals," he added.

Rice stated they have expended much effort advancing from where they are in 2-D space into being able to acquire 3-D data under the ice.

"This is another step change in the technology," he said, "and something we're very focused on."

Making the Impassable Possible

Weatherford's patented Compact™ well shuttle makes today's complex well geometries fully loggable

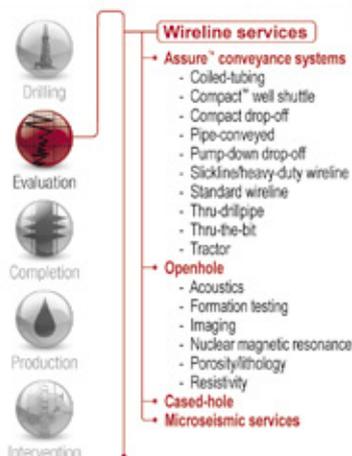


© 2012 Weatherford International, Ltd. All rights reserved. Trademarks copyright and patented Weatherford technology.

Go beyond wireline to optimize openhole logging. The Compact well shuttle is one of ten Assure™ conveyance options that give us an unrivaled ability to tailor logging programs to your well, minimize risks and obtain high-quality data—even in today's decidedly more complex wellbores.

The shuttle houses logging tools safely inside drillpipe as the pipe is rotated and circulated past obstacles to total depth. Tools are then pumped into open hole to log into memory as the drillstring is pulled out. That's **Tactical Technology™** in action.

To learn more about our wireline offerings with **more options** and **more service**, contact your Weatherford representative or visit weatherford.com.



weatherford.com

ICE Awardees Announced

In Singapore, for the first time in AAPG history, the technical paper and poster winners for an AAPG International Conference and Exhibition were announced onsite at the conclusion of the event.

The winning technical works for Singapore are:

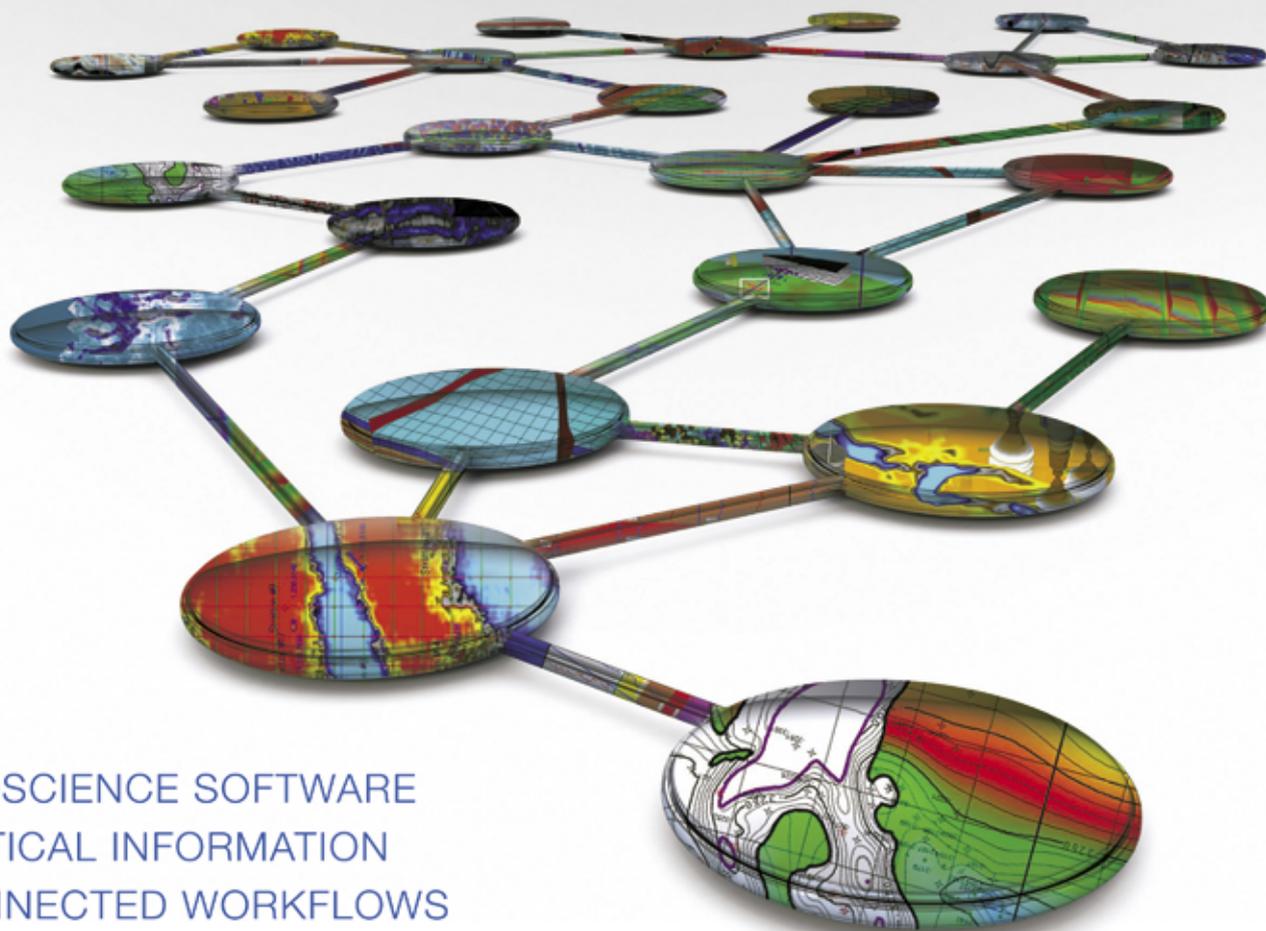
► Gabriel Dengo Award for Best International Paper – to **John Tinnin**, with Halcon Resources in Houston, for the paper "Case Study Demonstrating the Ability of 3D/3C Seismic to Predict Natural Fractures and Petrophysical Properties of Shale."

His co-author was Ron Harris, of Anadarko Petroleum, Houston.

► The Ziad Beydoun Memorial Award for Best International Poster – to **Bodo Katz, David M. Sibley** and **Adam J. Vonk**, all with Chevron in Perth, Australia, for the poster "Balancing Depositional Concepts and Seismic Attributes in Reservoir Models of Fluvial Deposits at Wheatstone, Northwest Shelf Australia."

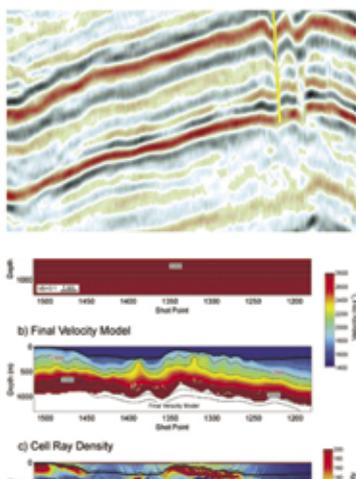
► The Carlos Walter M. Campos Memorial Award for Best International Student Paper – to **Apoorv Agarwal**, University of Petroleum and Energy Studies, Dehradun, India, for "Increasing of Fracture Conductivity of CBM Wells by Restimulating Fractures by Use of LWC Proppant and TSO Design."

► The Ozan Sungurlu Memorial Award for Best International Student Poster – to **Maisi Riswanti**, Institut Teknologi Bandung, Indonesia, for "Sequence Stratigraphy-Facies Analysis and Stylolite-Fracture Characterization Related to Porosity-Permeability in Carbonate Facies of Rajamandala Formation of Cikamuning Area, West Java-Indonesia."



- > GEOSCIENCE SOFTWARE
- > CRITICAL INFORMATION
- > CONNECTED WORKFLOWS

CONNECTED AT EVERY TOUCH POINT



Streamline data transfer and simplify project sharing with IHS geoscience software and critical O&G information.

The IHS suite of geoscience software—which includes IHS Petra[®], Kingdom[®], LOGarc[™] and GeoSyn[™]—is designed to seamlessly connect to the industry’s leading source of critical Oil & Gas information, eliminating the need to move data manually from source to source and project to project. With this powerful new combination, users can streamline data transfer, enhance database performance and simplify project sharing. The result? Workflows that connect like never before.

Connected workflows mean that IHS customers spend less time looking for data and more time looking for the next big opportunity. It’s just one of the many ways that IHS helps to advance the decisions that advance the Oil & Gas industry.

Find out more at IHS.com/geoscience



A wonderful world of color

Innovation Drives North Sea Exploration

By **KEN MILAM**, EXPLORER Correspondent

Who said getting older had to be a bad thing?

Not with the continuously advancing high tech world of exploration still finding newer approaches to familiar challenges.

And not when explorationists and their companies willingly embrace the technological advances that are proving to be valuable tools.

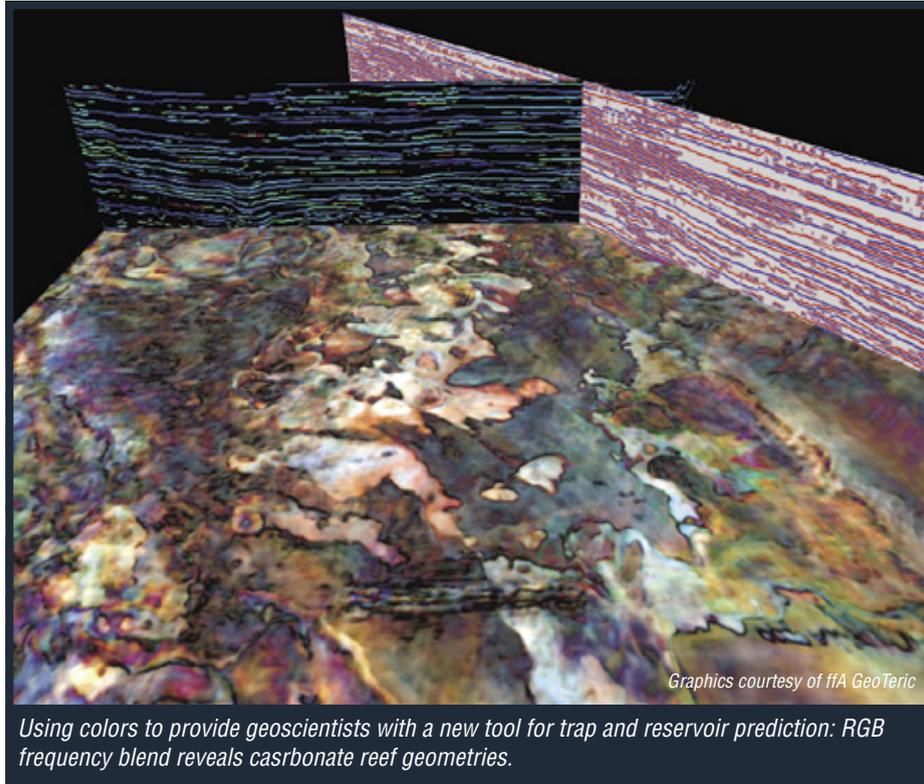
A specific example can be found in the maturing North Sea, where companies continue to look for better ways to exploit known resources – or to seek new discoveries, or to explore in frontier areas such as the Barents Sea off Norway's northern coast.

In the North Sea, "the simple four-way closures and rotated fault blocks are all drilled. The exploration target increasingly turns into stratigraphic traps with increased need for depositional control," said Trond Kristensen, geophysicist with independent Swedish oil and gas exploration and production company Lundin Petroleum.

Lundin has been deeply involved with the huge Johan Sverdrup and Edvard Grieg discoveries – and Kristensen said continuous learning is the key to Lundin's success.

"We always have time to listen to new or old companies with new ideas for the industry," he said.

"And once in a while something very good appears," Kristensen continued, "a new technique to look at fluid inclusions in



Using colors to provide geoscientists with a new tool for trap and reservoir prediction: RGB frequency blend reveals carbonate reef geometries.

cores, a new way of collecting seismic data, a new seismic processing algorithm, a new logging tool and so on."

On the Job

One helpful new method Kristensen specifically cites came from ffa's GeoTeric

software and its "frequency blend" technique.

"The Holy Grail for an oil explorer is to convert seismic data into the dynamic depositional environment existing at the time of the seismic reflectors," Kristensen said. "Understanding the ancient landscapes will help predict where to find

reservoirs and traps."

The "frequency blend" technique involves using advanced color visualization to simultaneously examine the seismic response within different frequency bands.

"We believe that the increased geological understanding provided by the frequency blend gives valuable information for trap definition and reservoir prediction," he continued. "Not all areas are as well-suited as others for this technique, but the new HDFD shows promise in hereto difficult situations."

(HDFD stands for "High Definition Frequency Decomposition," which has been developed to enable clearer isolation of features in their true depositional layers.)

Although the software wasn't used on the initial Edvard Grieg work, it since has been used on both the Grieg and more recent Johan Sverdrup discoveries.

"They share the same challenge regarding detailed reservoir predictions," Kristensen said.

"Otherwise, in exploration we have found the Barents Sea to be especially suitable for the frequency blend technique, showing beautiful depositional environments," he said. "This has been very helpful in the concession rounds in this area."

The displays also are great for communicating ideas, he added.

"You could spend a long time discussing small amplitude anomalies on the seismic,

See North Sea, page 34

Exploration is always a bit of a gamble, but your odds improve significantly using the best scientific information available

225,000+
SCIENTIFIC MAPS*
WITH 148,000+
GEOREFERENCED

Enrich scientific analyses and risk assessments for exploration

Accelerate productivity and efficiency of exploration teams

Improve discovery of maps, data and analogs

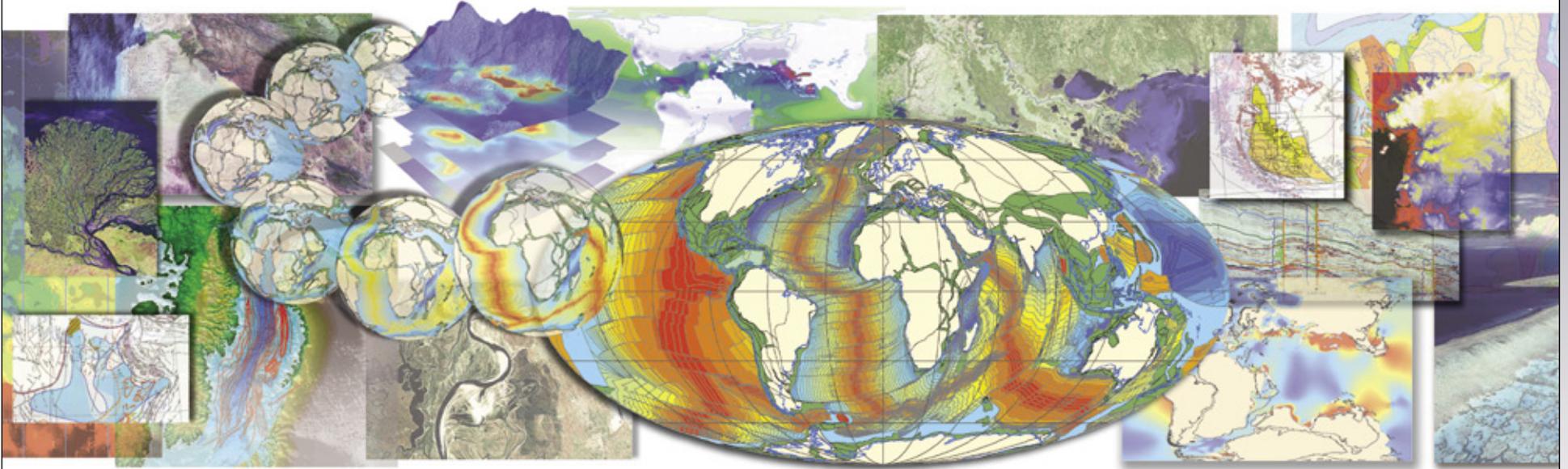
GEOFACETS
from ELSEVIER

With map-based search and scientific maps from trusted publishers, Geofacets is a must-have resource for today's exploration teams.

Visit info.geofacets.com to learn more and request a product demo

* Maps are added on a monthly basis

WHEN RECONSTRUCTION COUNTS...



...COUNT ON FUGRO

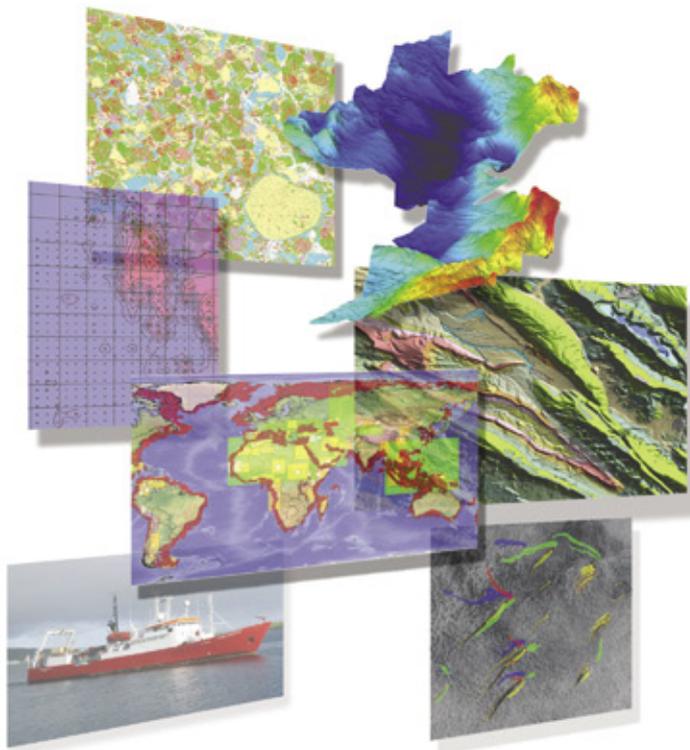


Plate Wizard™ is a globally consistent 'state-of-the-art' plate tectonic model and GIS software extension that allows accurate reconstruction of Earth's plates.

Plate Wizard™ incorporates a unique deformable capability and provides the necessary framework for meaningful:

- palaeogeographic mapping
- play mapping and structural evolution
- petroleum systems evaluation

Plate Wizard™ supports a wide range of Fugro Robertson's innovative products and services, including:

- **Global Thematic Studies (including MERLIN+)**
- **ERGO**
- **Tellus™**
- **Regional Petroleum Systems Evaluations:**

<i>Barents Sea</i>	<i>South Atlantic</i>
<i>South West Africa</i>	<i>Kurdistan</i>

FUGRO ROBERTSON IS PART OF THE FUGRO ROBERTSON GROUP OF COMPANIES

Comprising: Fugro Robertson Limited, Fugro Robertson Inc., Fugro NPA, Fugro Geolab Nor, Fugro GeoSpec, Fugro Robertson (Wallingford) UK

The Americas:

Fugro Robertson Inc.
Tel: +1 713 369 6100
Email: infoFR@fugro-robertson.com

China:

Fugro Robertson
Tel: +86 (10) 5908 1997
Email: guoxue.wang@fugro-robertson.com

Europe:

Fugro Robertson Limited
Tel: +44 (0) 1492 581811
Email: info@fugro-robertson.com

Malaysia:

Fugro Robertson
Tel: +603 2166 2433
Email: shafiq.rahman@fugro-robertson.com

Fugro Robertson

50th
Anniversary Year

1961 - 2011
Half a Century of Excellence





RGB frequency blend of carbonate reefs with overlying channel geobody.

North Sea from page 32

but when you can pull out a picture ... the discussion can be much more constructive and to the point," Kristensen said. "Some of this is also possible on more conventional attribute processing, but they are more difficult to define, and lack the almost picture-like clarity of the frequency blend."

Subject to Interpretation

The Adaptive Geobodies technology has been developed jointly by ffa and Lundin to "extract geological elements even when their expression is subtle or highly variable. It works by adapting the criteria for defining a specific object much in the way that the human visual system

does," said Gaynor Paton, ffa's director of geosciences.

In addition, she said because it recognizes that seismic data is an incomplete representation of the subsurface, the interpreter is free to step in and guide the delineation process when the data isn't enough on its own.

With this data driven-interpreter guided approach it is possible to extract 3-D geobodies, she said, representing features such as braided channel or karst systems, where it would have been impossible previously.

"To counter-balance the subjectivity introduced when a data driven process is overridden by manual intervention, objects defined in this way are assigned a confidence value that indicates how well the surface position respects the underlying data," she said.

"This shows where the interpretation

is data-constrained," she added, "and where it is defined by the expertise of the geologist or geophysicist."

Color My World

The industry's "huge reliance on seismic data" has naturally led to an enormous investment in acquiring more data and improving the quality of seismic acquisition and processing systems – but "to maximize the value we can obtain from this investment we need to see similar advances in techniques for interpreting seismic data," said Jon Henderson, ffa's managing director.

"Advancing seismic interpretation needs to be tackled from two directions," he continued. "One of these is improving quantification and is geophysics/rock physics led; the other is to make certain aspects of interpretation more geologically led.

"This means converting seismic data into geological images."

A good analog for this approach, he said, can be found in medical imaging, where the key to successful diagnosis is to present the image information to a clinical specialist in a manner that enables them to understand the anatomical or physiological changes caused by the disease or trauma.

One of the keys to this "geological expression" approach is to present multiple aspects of the seismic response (attributes) using sophisticated 3-D visualization techniques – as illustrated by the "frequency blends" described by Lundin.

Combining multiple attributes makes the most of the human eye's ability to perceive color – it can discriminate about 10 million different colors compared to just 500 shades of grey.

"If we combine images in the correct way, the information content of the combination can be many times higher than just the sum of the information contained in each of the inputs," he said.

Combining these factors together makes it possible to see clearly geological features that are associated with only very subtle changes in seismic response – a critical dynamic in the quest to identify new opportunities in mature areas and for understanding reservoir complexity.

"While converting geophysical data into geological images is a great way of increasing and communicating knowledge and geological understanding, it is also important to be able to delineate and measure the geological elements that are revealed," Henderson said. "This is where understanding how we perceive image data has a major impact. While the human interpreter can usually outperform even the most sophisticated image analysis system in tasks centered round feature recognition, we are much less adept if asked to accurately measure the features that we see.

"On top of this," he continued, "seismic data provides a noisy, incomplete and often ambiguous representation of the subsurface.

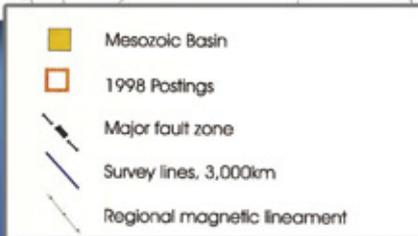
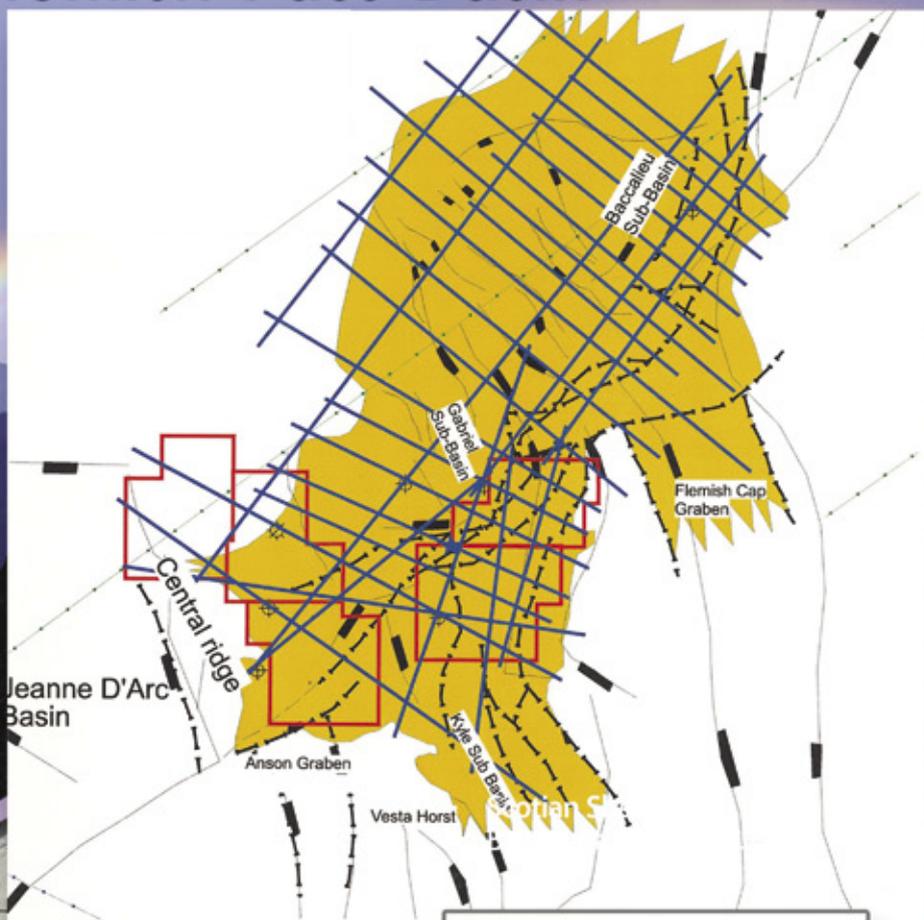
"Without the expertise and knowledge of the interpreter it would be very difficult and in some cases impossible to resolve these ambiguities," he added.

"What we need to explore in developing new interpretation technologies is not replacing the geological insight brought by the interpreter, but ways of utilizing this insight simultaneously with objective mathematical analysis," Henderson said.

It's what he calls "bringing together the art and the science of interpretation." ■

North Flemish Pass Basin

The North Flemish Pass Basin is virtually unexplored despite being analogous to the Jeanne D'Arc, with significant source rocks of over 2.5% TOC present in the deeper wells. This is postulated to be equivalent to the prolific Egret formation in the Jeanne D'Arc and is extensively located.



JEBCO Seismic, L.P., 2450 Fondren Rd., Ste. 112 / Houston, Texas 77063
Phone: (713) 975-0202 Fax: (713) 975-9293
E-mail: wayne@netropolis.net / avernon@jebcoseis.com





Not So Risky After All!

AutoSeis[®]: Unbelievably simple, totally scalable, with no interconnecting cables or complex radio networks. And despite all of the fear mongering of detractors, after deploying over 80,000 channels and recording over 200 trillion samples of true 32-bit seismic and microseismic data, data losses for all reasons (including theft and sabotage) rival that of a traditional cabled telemetry system. Proven world over, in all environments, AutoSeis dramatically improves crew productivity and data quality while simultaneously reducing HSE risk and environmental impact.

AutoSeis[®]: Simple is Smart

- fully autonomous nodal recording system
- broadest dynamic range
- lowest weight and power consumption
- unlimited channel count



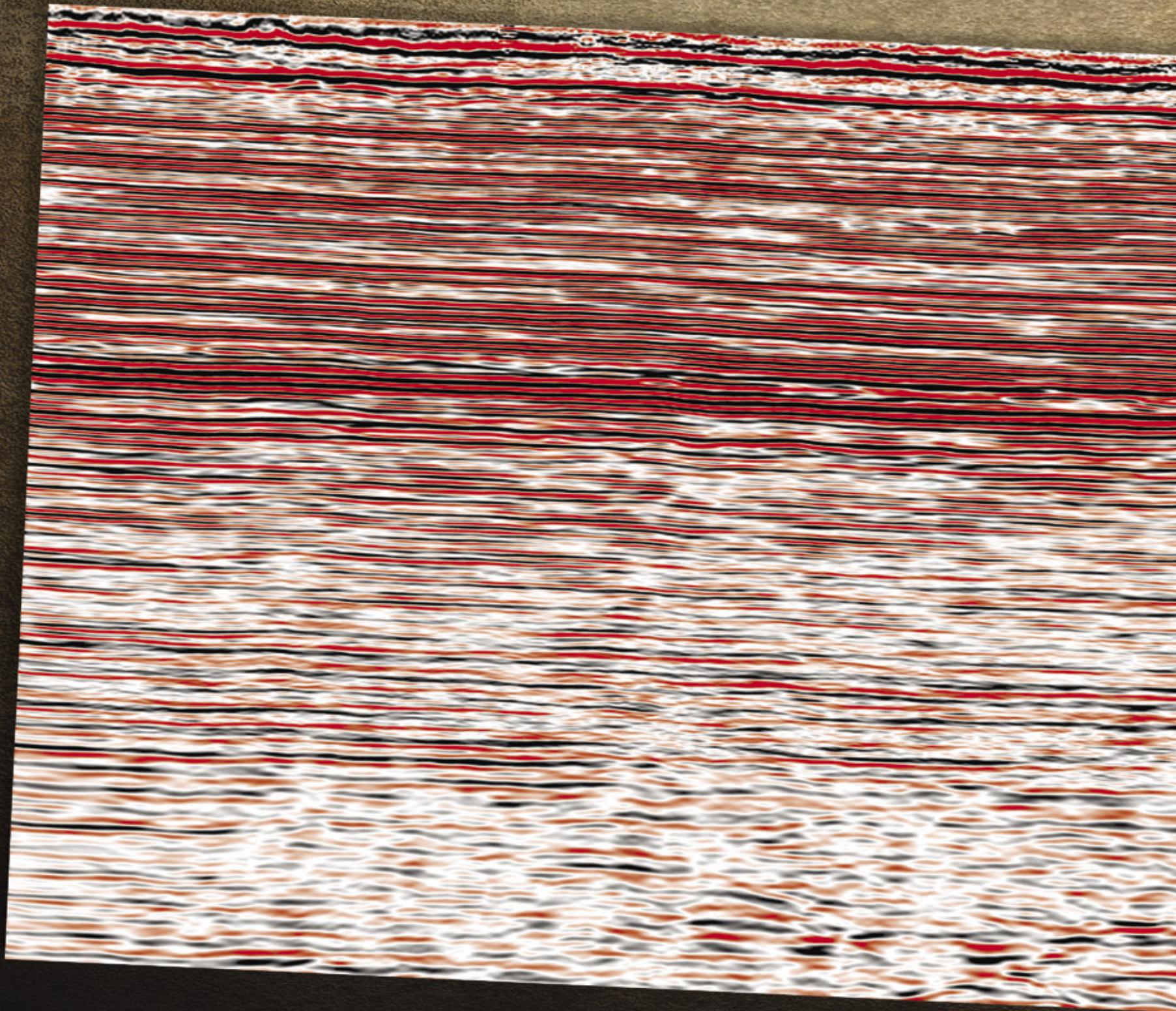
See us at
SEG
#1854

AutoSeis[®]
AUTONOMOUS NODAL TECHNOLOGIES

Global Geophysical Services, Inc.
13927 S. Gessner Road ● Missouri City, TX 77489
tel +1 713-972-9200 info@autoseis.net www.autoseis.net



TGS DELIVERS U.S. ONSHORE

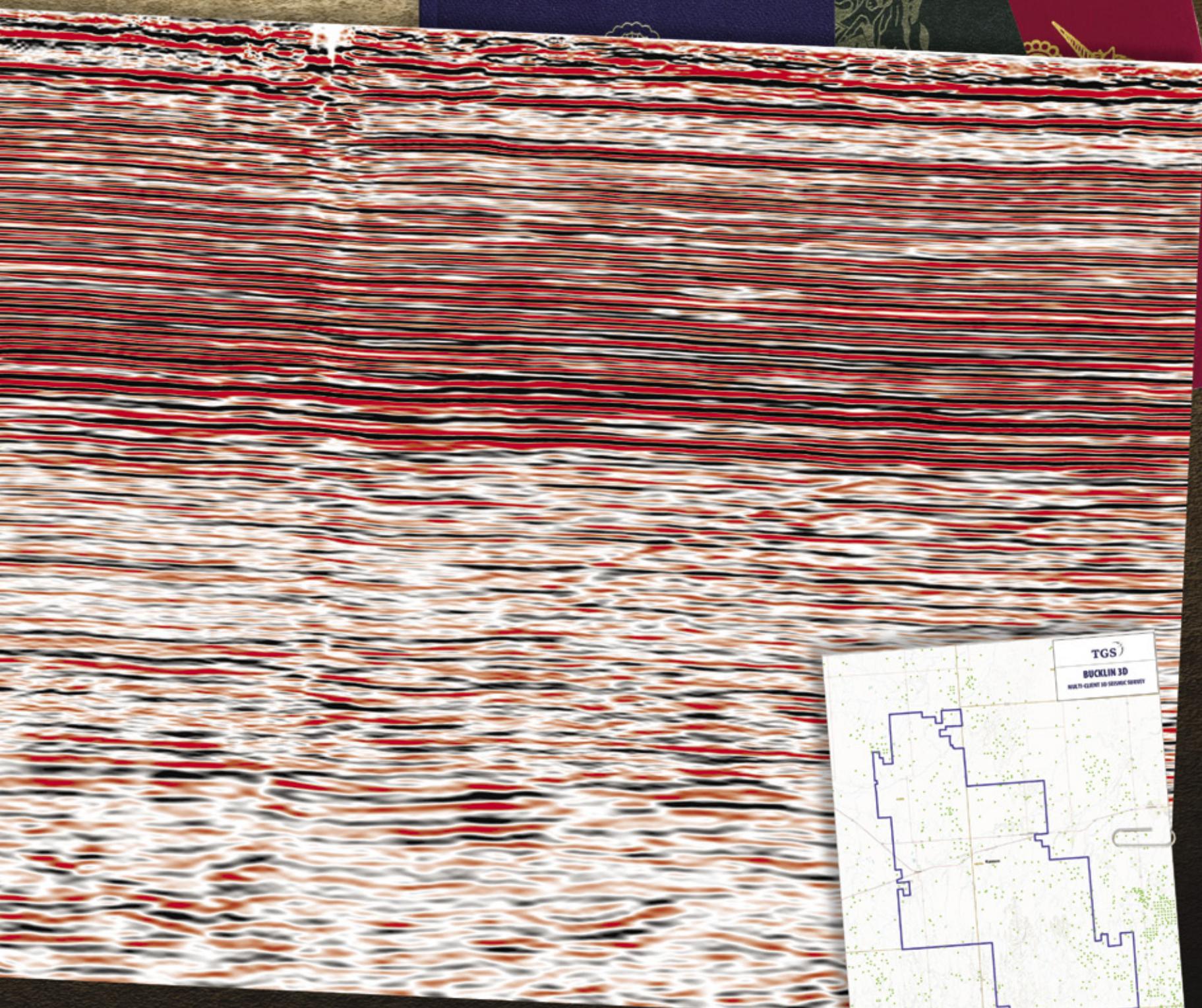


BUCKLIN 3D – MISSISSIPPI LIME

The Bucklin 3D onshore project is 262 mi² (422 km²) in size and is located in Ford and Kiowa counties in southern Kansas. To aid in the development of this shallow, oil-rich play, PSTM volumes are now available and are complemented by TGS' unequaled well data coverage.

Contact onshore@tgs.com for more information.

SHORE SEISMIC



Learn more at WWW.TGS.COM

Seismic crews tackle a variety of concerns

Ice Isn't the Only Challenge in Arctic Waters

By KEN MILAM, EXPLORER Correspondent

Arctic conditions at sea pose special challenges in gathering seismic exploration data – and ice in the water, while a big problem, isn't the only obstacle.

There's the wind.

There's the low-lying ice.

There's the environment.

There's the local population.

And perhaps mainly, you can add to the list the challenge of simply protecting the new technology and equipment needed for 3-D seismic surveys, which can be especially at risk.

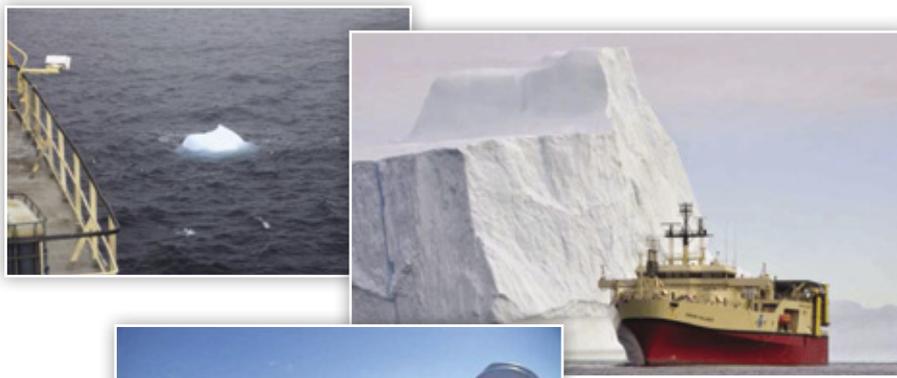
"It's very difficult to protect the equipment, so ice avoidance is the best strategy," said David Lippett, geophysical adviser for Arctic veteran Petroleum Geo-Services.

That's not as easy as it might seem.

Even in so-called "ice-free" waters in summer months, icebergs, bergy bits, growlers and drift ice threaten ships and seismic arrays.

The summer season in the area between Greenland and Canada typically lasts from June to October, so gathering as much data as possible in a limited time is important. Careful planning to avoid known areas of ice must be routine.

Smaller equipment spreads of six to eight streamers are easier to protect by steering around ice. Using 10 to 14 streamers helps pull in more data in less time, but a 3-D equipment spread being towed can stretch a kilometer wide and several kilometers in length, Lippett said.



Photos courtesy of
Petroleum Geo-Services

Larger spreads may offset the risk of damage by taking less time, he added.

Growlers and bergy bits – chunks from larger icebergs – usually float low in the water, weigh several tons and may be 90 percent below the surface. They are difficult to spot visually or with radar.

And even when the ship steers around the obstacles, the ice can still wreak havoc on the towed equipment.

"We constantly look at ways to adapt our equipment," Lippett said, "or new ways to gather data."

Pristine Environments

Equipment that can be towed at greater depths with new multi-sensor streamer technology is one method being used. At 15-20 meters deep, the streamers are below the growlers and drift ice.

Deep towing also allows a survey to continue during rougher weather, saving further time.

Ocean bottom nodes – single, remote units placed on the seabed without cable or other connections to the surface – "may

be best for year around coverage," Lippett said.

"The technology is out there, but ... it's not straightforward, it's slower," he said, "and until the technology is more mature, it's not as efficient as using streamers and hydrophones."

Other technology needs to be explored as well, he said. Specialized radar for detecting low-lying ice needs to be refined more, he said.

Vessels must be fit for arctic conditions. "The remoteness means you must be very self-sufficient for the health and safety of the crew," he said.

Ice is only one challenge.

"We're working in pristine environments, and seismic can have an impact on marine mammals and the environment," Lippett said.

Working responsibly with local communities that might be affected also is important.

Narwhales are a highly protected species, and in some areas there are people who traditionally hunt the mammals for subsistence.

Hence, exploration surveys must be planned to avoid disrupting breeding patterns and displacement of the animals, Lippett said.

"We don't believe our sound sources have a serious impact, but we still have to comply with permitting regulations," he said. "We try to develop sound sources that are as efficient as possible, with no unnecessary disruption." ■

AAPG GEOSCIENCES TECHNOLOGY WORKSHOP



LATIN AMERICA

INFORM DISCUSS LEARN SHARE: THE AAPG GTW EXPERIENCE



Vaca Muerta-the Leading Shale Play in Latin America

2-4 December 2012 • Buenos Aires, Argentina • InterContinental Hotel



View the Complete Technical Program and Register Now at

<http://www.aapg.org/gtw/argentina2012/index.cfm>

Limited seating – Online registration ends November 28 – No walk-ins

For comprehensive and successful exploration...



...we need to:

- Research all relevant published literature
- Interpret all available well and outcrop data within a globally consistent framework
- Produce a series of stratigraphically-precise facies maps, chronostratigraphic charts and play schematics
- Access a comprehensive organic geochemistry and petroleum fluids database
- Place local biostratigraphic schemes into a regional or global context to improve correlation
- Utilise a high-resolution geodynamic plate model to aid prediction
- Integrate all data in a 3D format for rapid regional assessments
- Integrate with seismic data to create play analyses and prospect generation.

www.neftex.com/nowexplore

Contact us today if you need help ticking off your exploration to-do list

Now Explore



For more information contact: Website: www.neftex.com Email: enquiries@neftex.com
 Tel: +44 (0)1235 442699 Facebook: www.facebook.com/neftex

Ayrton finds – and features – the fossils

Urban Geology: The Walk of Life in Calgary

By SUSAN R. EATON, EXPLORER Correspondent

State-of-the-art computer software programs enable petroleum geologists to investigate large quantities of subsurface geological data in record-breaking time.

Yet, despite such technological advances, many geologists lament the fact that they rarely have time to travel to the field, that they rarely experience the tactile sensation of laying their hands on outcrops.

But a group of Canadian oil and gas geologists and geophysicists has discovered that a four-hour-long “urban” geology field trip can be just as rewarding as one to the wilds of the Rocky Mountains.

During a recent half-day walking tour of downtown Calgary, Alberta, the geologists (and their friends and spouses) studied the building rocks found in oil company towers and historic churches and hotels.

In the process, they learned about the history of Canada’s oil and gas industry, discovered the existence of two-foot long fossils and were exported to exotic locales around the world, viewing building stones ranging in age from the Precambrian to the Tertiary eras.

Kneeling down to examine polished floors in oil company towers, the enthusiastic group – equipped with backpacks, hand lenses and acid bottles – attracted the attention of security guards who, on a couple of occasions,



Photos courtesy of Perry Davis

Bill Ayrton in front of Calgary’s Knox United Church, built of locally quarried Tertiary age Paskapoo Sandstone and Paleocene age Brown Sandstone, which exhibit massive cross-beds and are fluvial in nature.

asked the group why they were taking photos.

Developed and led by AAPG member Bill Ayrton, the “Building Rocks of Calgary Geological Walking Tour” often is used by the Calgary oil and gas industry as a team-building exercise.

President of Ayrton Exploration Consulting Limited, Ayrton’s oil and gas career has spanned more than 40 years.

“People tell me that the field trip has changed the way they walk around

downtown,” said Ayrton, a former president of the Canadian Society of Petroleum Geologists. “I usually apologize to them, saying, ‘Now, you’re going to be late for work.’”

“People are fascinated by what they see in their own back yards,” he added, “and even in their elevator banks.”

It Begins With the Rocks

Ayrton’s tour examines the rocks,

sedimentary features and fossils found both inside and outside the buildings of Calgary.

Building stones include locally quarried sandstones and spectacular varieties (igneous, metamorphic and sedimentary) from as far away as Scandinavia, Italy and India. Polished slabs and differential weathering of exterior surfaces reveal textbook geological features, including cross-bedding, porosity, stylolites, fossils, burrows, vugs and euhedral crystals.

Ayrton described the oil and gas companies’ imposing lobbies, with their impressive use of imported marbles, travertines and granites, as their “calling cards.”

The oil strike at Leduc, in 1947, he said, heralded the beginning of the Alberta “gold rush.” Since then, Calgary’s skyline has kept pace with Alberta’s oil and gas discoveries, climbing from low rises to high rise towers topping 60 stories.

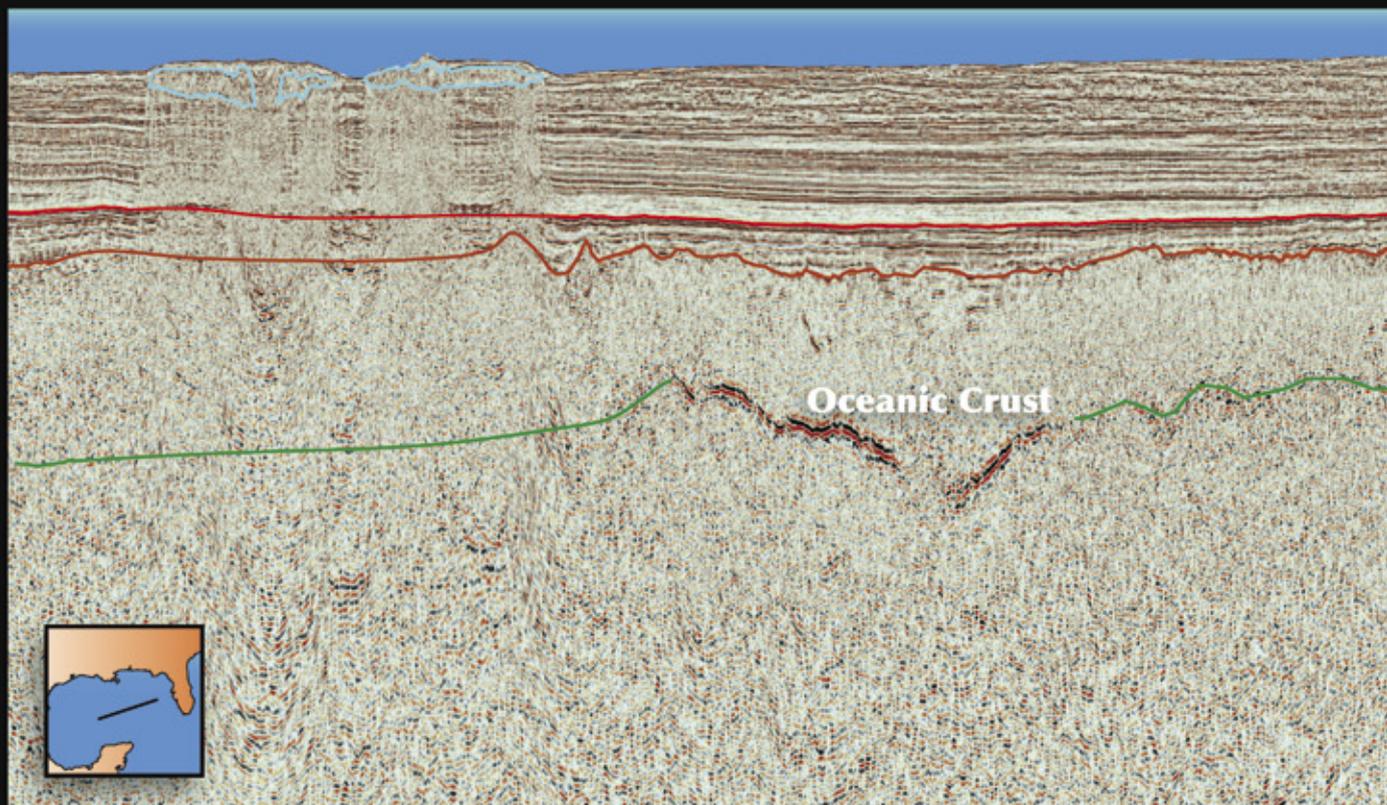
Historical aspects aside, Ayrton pointed to other compelling reasons for petroleum geologists to participate in the urban geology field trip:

“I firmly believe that in the oil and gas industry, everything begins with the rocks,” he said. “Today geologists are transfixed by working on computers – but we don’t get rock descriptions from computers.”

[Continued on next page](#)

“A man should look for what is, and not for what he thinks should be.”

-Albert Einstein



- A punch of energy designed to send signal to the earth’s crust; a 15km cable to receive it.
- A basin-wide network of deep water images to 130,000 ft. and above.
- A new foundation for petroleum system calibration and a means to define the next generation of plays.



Hiding in plain sight: Those who know where to look in Calgary can find, from left, polished floor tiles that include granites and sedimentary rocks from around the world; the sandstone columns in the Royal Bank of Canada Building, made of locally quarried Tertiary age Paskapoo Sandstone and containing beautiful examples of fluvial cross bedding; at Northland Place, dolomitized fossils – this one is a Maclurites snail – in Tyndall Stone; again at Northland Place, a dolomitized fossils of an orthocone (nautilus), in Tyndall Stone; a wall of fossil rock located in Shell Canada Limited's corporate head office – this rock is a fossilized shale that was recovered from a quarry in northeastern British Columbia by Oldstone Rock Quarries Ltd., from the Triassic Period. The predominant fossil is Monotis subcircularus, which is a direct descendant to the modern day scallop Pectinidae family. Shell's emblem or corporate logo was originally a mussel shell, but was changed to a scallop shell or "Pecten" emblem in 1904.

Continued from previous page

Spotlighting Some Real Gems

The geological field trip was sponsored by CMAGS, the Canmore Museum and Geoscience Centre, a not-for-profit organization located a one-hour drive west of Calgary.

Dedicated to geoscience education, CMAGS mounts exhibits and designs programs that showcase the human and geological stories of the Rocky Mountains.

Rick Green, AAPG member and president of CMAGS, described the building rock field trip as a perfect teaching vehicle to educate the organization's broad audience – geoscientists, teachers, students, families and tourists.

Green, a petroleum geophysicist, characterized the inaugural building stone field trip, comprised of eight students led by Ayrton, as a "huge success."

"I saw a much wider range of fossils than I could see in the mountains, in any given field trip," Green said. "You can walk around downtown Calgary and view great specimens up close."

"These secret gems are hidden from view, from passersby, unless you know that they're there," he added. "And Dr. Ayrton brought these gems out."

The group of intrepid explorers was fascinated by the "gems" found in the many buildings constructed of Ordovician age Tyndall Stone. Chock-a-block full of trace fossils – dendritic patterns of burrows left by ancient sea critters – Tyndall Stone also contains corals,

gastropods, bivalves, brachiopods, nautiloids, bryozoans, stromatoporoids, trilobites and calcareous algae. Field trip participants lined up for photographs beside a particularly well-preserved nautiloid that measured two feet long.

Still quarried in Garson, Manitoba, Tyndall Stone's distinctive – and much sought-after – mottled texture led to its use in Canada's parliament buildings and in the grand hotels built by Canadian Pacific Railway along its scenic route through the Rocky Mountains.

"Tyndall is an absolute graveyard; it's a fossil hash," Ayrton exclaimed as he applied (sparingly) hydrochloric acid on an exterior wall, demonstrating the phenomenon of selective dolomitization – the darker colored (burrowed) sections of the mottled stone are dolomitic while the lighter colored sections which are calcitic.

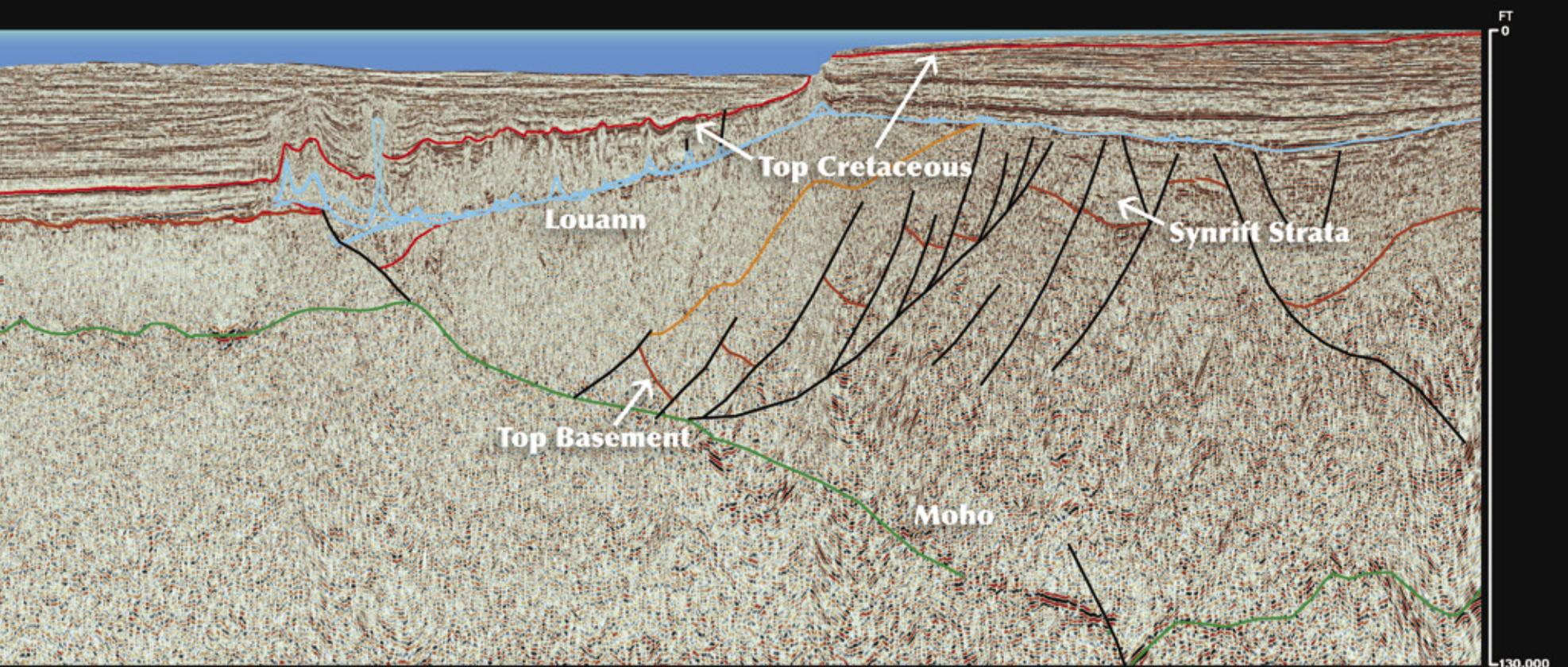
'An Eye-Opener!'

Because the fossils also are dolomitized – and thus more resistant to weathering – they are prominently featured in the Tyndall Stone's limestone matrix.

"Not many people would think of doing a geology field trip in Calgary, and it was surprisingly interesting," said Brent MacDonald, CMAGS' earth science coordinator responsible for developing educational outreach activities targeting K-9 students.

The walk-about provided MacDonald with innovative ideas for hands-on student activities, ranging from scavenger hunts, draw-the-fossil-on-the-wall competitions (using tracing paper,

[See Urban Geology, page 43](#)



We asked, we listened and now we are delivering answers to your most important questions in Gulf of Mexico exploration.
 Call us today to journey deep into the future!

713-489-8800
 info@dyngp.com
 www.dynamic-dataservices.com



Many Hearings, Some Questions, Few Answers

By EDITH ALLISON, GEO-DC Director

A APG provided a glowing introduction to me last month in this column, but now that it is time for my first column:

Washington policy continues to defy simple explanations. Washington is essentially shut down for pre-election campaigning and Congress passed almost no bills this year.

There were, however, many House hearings regarding energy issues as representatives sought to define their positions before the Nov. 6 election.

One, the Aug. 2 hearing of the Energy and Commerce Subcommittee on



ALLISON

Energy and Power, featured witnesses who testified that federal onshore petroleum production declined in the past year, and regulatory changes could

The roots of these changes are relatively straightforward; however, the role of federal government policy in driving this decline is less clear.

spur – or hinder – future production increases.

The hearing, called by Rep. Ed Whitfield (R-Ky.), looked into the disparity

in energy production of onshore federal versus non-federal lands, a topic that impacts a variety of current issues – jobs, energy security, protection of environmentally sensitive lands, and state and federal deficits, to name a few.

U.S. oil production grew in 2012 to an average of 6.2 million barrels per day – a level not seen since 1998, according to the Energy Information Administration. Natural gas production also rose, primarily in liquids-rich shale gas areas.

On the other hand, oil production from federal and Indian lands decreased from two million barrels per day in fiscal year (FY) 2010 to 1.8 million barrels in FY2011, the most recent annual statistics. This represents a decline in oil production on federal lands from 36 percent of total U.S. production in FY2010 to 32 percent in FY2011.

Natural gas production from federal and Indian lands continued a multi-year decline; in FY2011 federal and Indian lands produced 21 percent of domestic natural gas, compared to 35 percent in FY2003.

The roots of these changes are relatively straightforward; however, the role of federal government policy in driving this decline is less clear.

Let's start with the simple elements:

► The major reason for the onshore federal-private land production disparity is the increased industry emphasis on oil and gas from shales, which are located predominantly on state and private land.

► Offshore, the price-driven movement of operators from the gas-prone shelf to oil-prone deep water cut gas production. The deep-water drilling moratorium and regulatory restrictions after the 2010 Macondo blowout also have reduced oil production in federal waters.

* * *

The hearing highlighted the differences between a booming oil industry working primarily on private land in North Dakota and a declining oil industry in Alaska, where future potential resources are primarily on federal lands.

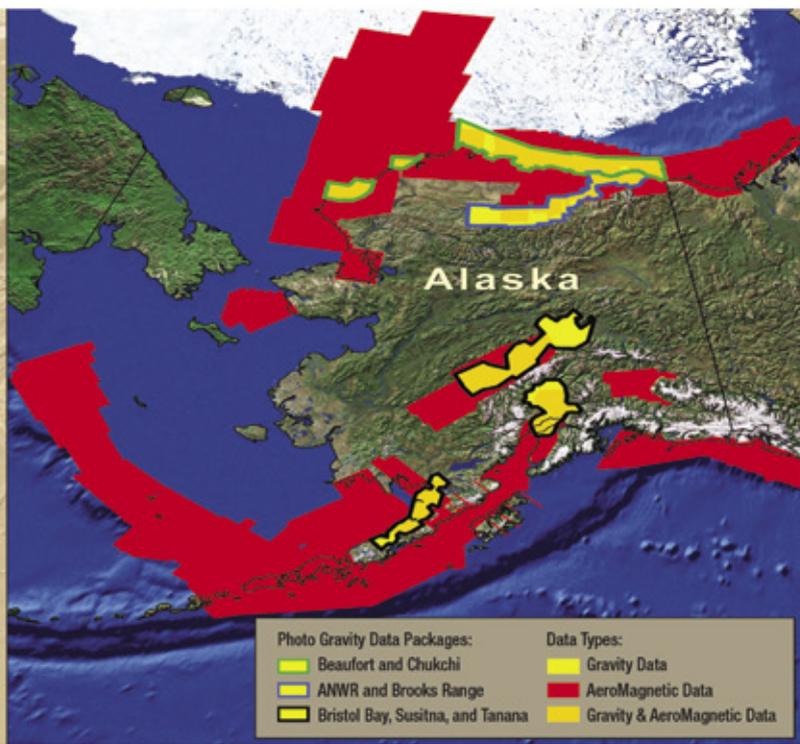
Lynn Helms, the director of the North Dakota Industrial Commission, stated that North Dakota drilling permits on private land are processed within 20 to 30 days, but federal drilling permits require more than six months.

Dan Sullivan, a commissioner for the Alaska Department of Natural Resources, recommended modernizing and reforming the federal permitting system and provided several detailed examples of what he viewed as excessive federal regulation that hindered oil and gas development.

One of his examples, Shell's Chukchi Sea well, did get the necessary permits – in September, too late in the season to allow drilling to the potentially productive formations.

Additional witnesses at the hearing opined that leasing reform, instituted at the beginning of 2011 by the Bureau of Land Management (BLM), may be the root cause of production declines on federal lands, or it may be the beginning

For Gravity and Magnetic Data in Alaska Count on Fugro— Mapping Geology to the Basement...



...And beyond with the most comprehensive non-exclusive airborne, land and marine potential fields geophysical database, including AeroMagnetic, Land Gravity, Marine Gravity and Bathymetry data around the world. Interpretation includes:

- Basement architecture
- Tectonic elements
- Structural/geologic fabric
- Salt mapping
- Depth to basement
- ArcGIS deliverables



Fugro Gravity & Magnetic Services

For personal assistance & consultation, please contact Dr. Nancy Bowers, Senior Geophysicist at nbowers@fugro.com or +1 713-369-6139.

www.fugro-gravmag.com

Continued on next page

Urban Geology from page 41

of course), stratigraphic columns, palaeontology, the oil and gas industry, history and architectural styles.

Retired geologist Lemuel MacDonald, a member of the CMAGS board of directors, was on the hunt for one of the rare fish fossils found in Tertiary age Paskapoo Sandstone, called the building stone field trip an "eye opener."

In 1886, after a fire destroyed Calgary's nascent pioneer town, fire resistant sandstone replaced wood as Calgary's primary building material.

"It was mandated after the fire that all public buildings had to be made of Paskapoo Sandstone," Ayrton said.

During the early 20th century, 15 local quarries provided Paskapoo Sandstone for public buildings and for the grand homes constructed of brick and decorated with ornamental sandstone. Shedding its pioneer beginnings, Calgary emerged from the fire and became known as "the Sandstone City of the West."

MacDonald was struck by variations "durability" between the Paskapoo Sandstone and the non-porous granites, which have a natural polish.

"The sandstones were clearly weathering at Knox United Church," he said, "the result of the porous rock absorbing moisture." Opened in 1912, Knox United was constructed of cross-bedded Paskapoo Sandstone, which is prone to freeze and thaw during weathering processes.

A Perfect Ending

Not parting with tradition, the group of intrepid explorers finished off the geological field trip with a cold beer or two.

Fittingly, the group chose to patronize the Sandstone Bar in the Hyatt Regency Hotel, a modern building that spans a city block and boasts the original sandstone and brick façades built in the early 1900s.

As for Lemuel MacDonald, at his leisure and during the summer months, he'll continue to explore the Sandstone City's numerous historical buildings, in search of elusive fish fossils.

For more information on Ayrton's walking geology field trip go to cmags.org, ayrtonexploration.com and ayrtonexplorion.com/course6.htm. 



"The Editor," carved in 1911 out of locally quarried Tertiary age Paskapoo Sandstone.

Continued from previous page

of a production growth spurt.

On the positive side is BLM's effort to reduce leasing delays due to protests. On the negative side is a proposed BLM regulation of hydraulically fractured wells.

The assistant director of the BLM, Michael D. Need, lauded new procedures that allow for greater environmental review and public participation before a lease sale, which greatly reduces the number of legal protests that can significantly delay lease development.

In the past, protests were the only ways for organizations or individuals to raise concerns about a lease sale.

Christy Goldfuss, a witness from the Center for American Progress Action Fund, noted the Wilderness Society's July 2012 report, "Making the Grade," which tallied a two-thirds reduction in protests in 2011, the first full year under the BLM reforms. The result is that companies are now receiving their leases within one to two months of the lease sales.

There is still a large backlog of protested leases sold between FY2007 and FY2009.

On the other hand, a proposed BLM regulation could slow oil and gas production from federal lands. BLM's proposed rules for hydraulically fractured wells would require disclosure of the chemicals used in hydraulic fracturing operations, strengthen regulations to assure wellbore integrity and establish water management requirements for flow-back fluids. The public comment period that resulted in over 7,000 comments closed on Sept. 10.

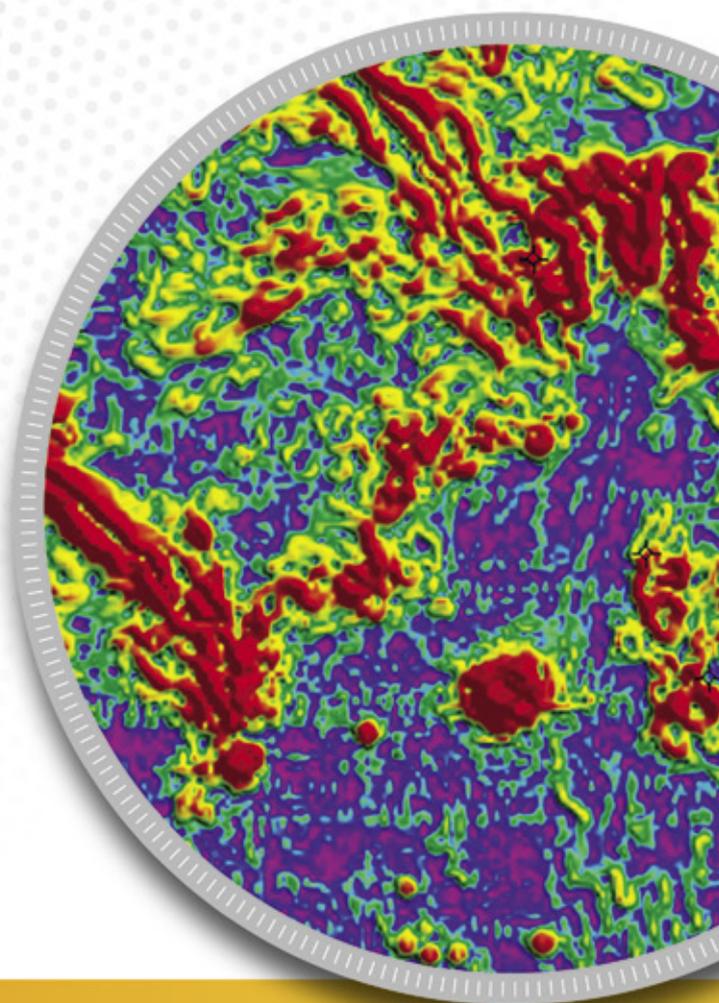
At press time, BLM had not announced when it will complete its analysis of the public comments or issue the final regulation.

* * *

The proposed BLM regulation and the Environmental Protection Agency's hydraulic fracturing study have motivated many bills that were introduced in Congress this session to revise or streamline federal regulatory processes, or to assure that states rather than the federal government control the regulatory processes for oil and gas development. However, none of these have passed both the House and Senate and none are expected to become law.

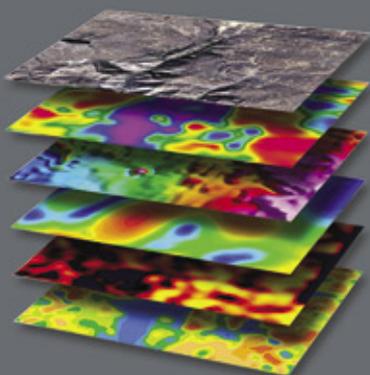
Look for more on this topic in next month's Washington Watch. 

MORE WAYS TO SPOT THE SWEET SPOT.



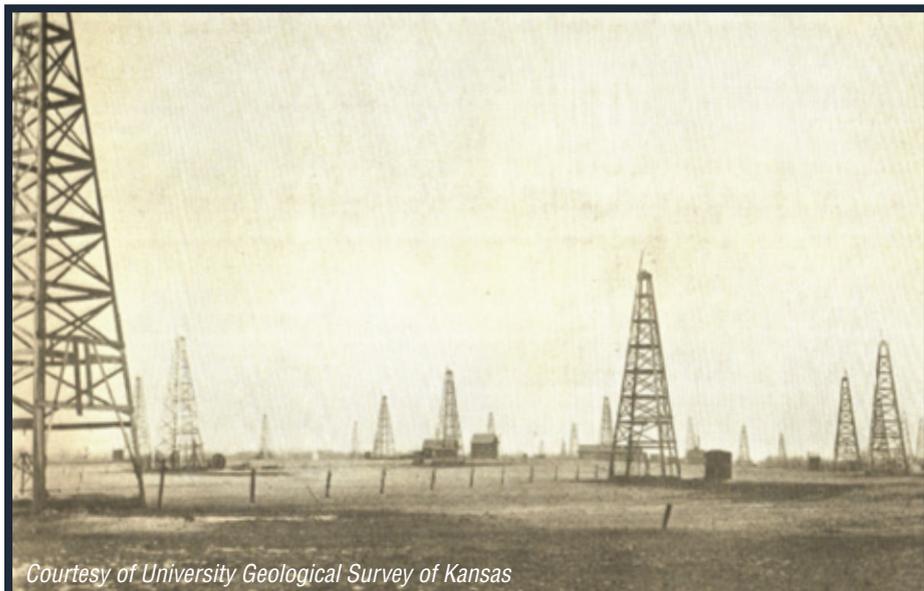
GAIN MULTI-MEASUREMENT INSIGHTS WITH NEOS.

GRAVITY | MAGNETIC | ELECTROMAGNETIC | RADIOMETRIC | HYPERSPECTRAL | SEISMIC



Identify fault and fracture networks from the basement to the surface. Map deep or regional structural features that influence reservoir productivity. Delineate brittleness or liquids' variations on an areal basis. And spot near-surface geo-hazards. With NEOS multi-measurement interpretation, you can do it all quickly. And at a fraction of the cost of traditional ground-based data acquisition methods. By integrating newly acquired airborne datasets with existing seismic and well data, we deliver highly constrained 3D models of the subsurface and provide the insights you need to make decisions about where to explore, lease, and target future seismic investments. Find out more at neosgeo.com





Courtesy of University Geological Survey of Kansas

A field of derricks on Barker Oil's land, about two miles north of Chanute, Kan.

HISTORICAL HIGHLIGHTS

State has a rich heritage

Striking It Big in Kansas

By LAWRENCE H. SKELTON

In January 1860, Lawrence, Kan., newspaperman George W. Brown, while visiting his hometown of Conneautville, Pa., was captured in the excitement of a new oil boom radiating from nearby Titusville.

He quickly recalled how five years earlier he had heard of an "oil spring" on the banks of Wea Creek in his own state, in Miami County.



SKELTON

Brown hurried back to Kansas, examined his newspaper files and found the location of the spring – and then he and a friend hastened to Miami County and found oil seeping from the creek banks as described.

They returned to Lawrence and formed a company of seven men, then returned to Miami

County and leased 30,000 acres for 30 years.

Brown hired a drilling rig and on June 1, 1860, began drilling at the oil seep. The drill reached 100 feet depth with no oil, so the rig was moved eight miles downstream, where a second well was attempted – again with negative results.

The rig was moved again, to the site of an old water well on the Baptist Indian Mission grounds, then owned by a David Lykins. This time, they found oil – but the well was not commercial, and work was halted by winter weather and the Civil War.

Still, in 1990 the Kansas Independent Oil and Gas Service, a Wichita reporting service, published a completion card that reported the Lykins No. 1 reached total depth of 275 feet and had produced one barrel of oil per day.

The Lykins well was the beginning of the Kansas oil and gas industry.

Gas-Driven Beginnings

After the Civil War, exploration and drilling began anew in Miami County and spread from there in search of gas – there was little use for oil on the Kansas frontier.

In 1867, a well drilled near Fort Scott in Bourbon County found sufficient gas to pipe into a house for domestic use – the first such use in Kansas and perhaps west of the Mississippi River.

In 1869, an attempt to establish a gas utility in Fort Scott failed because of a pre-existing coal-gas operation. Similar wells in eastern Kansas were marginally successful, but crude oil was still shunned.

In 1882, a well in Miami County found sufficient gas "to light a city of a million inhabitants," and that gas was piped into Paola, the first city in Kansas to be so supplied.

More producing gas wells followed, and in 1893 a well drilled at Iola in Allen County came in at three MMCFGPD. That was the beginning of the Mid-Continent gas field – a giant at the time, which occupied "a broad strip of territory, some 550 miles in length, extending some 250 miles southward along the eastern side of Kansas and Oklahoma."

The area around Iola and to the south extended to Montgomery County, where by 1904 the Independence field had open-flow capacity exceeding 700 MMCFG.

A Legendary Touch

During the frantic search for gas, however, more oil was found.

In 1892, for example, the No. 1 Norman, a proposed gas well near Neodesha in Wilson County, struck oil, so the driller took a sample of it to Pittsburgh to see if oil-oriented investors would be

See [Kansas](#), page 46

Data so thorough – you'll look like a local (the parka helps too).



If you're looking for opportunities in Canada, **geoLOGIC's data** is one tool you have to have. Offering the industry's leading range of value-added records on the Western Canadian Sedimentary Basin, geoLOGIC will guide your explorations in this resource-rich country and help you to make the best decisions possible. For details, visit www.geoLOGIC.com/data



geoLOGIC
SYSTEMS

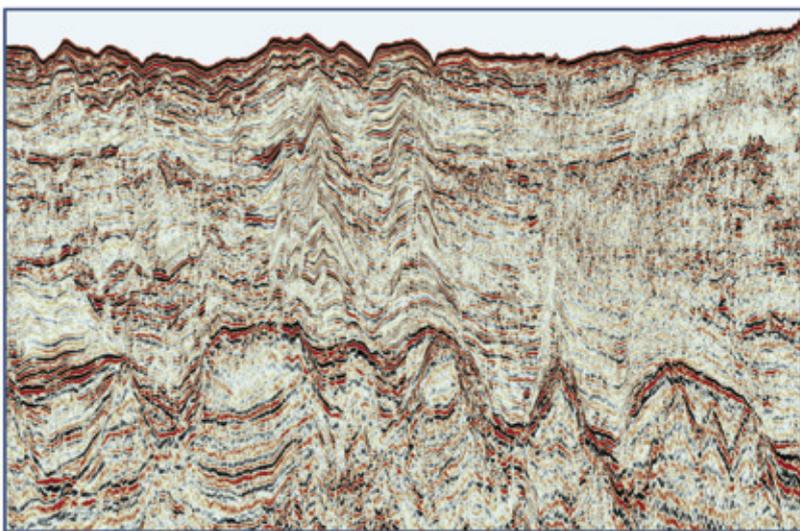
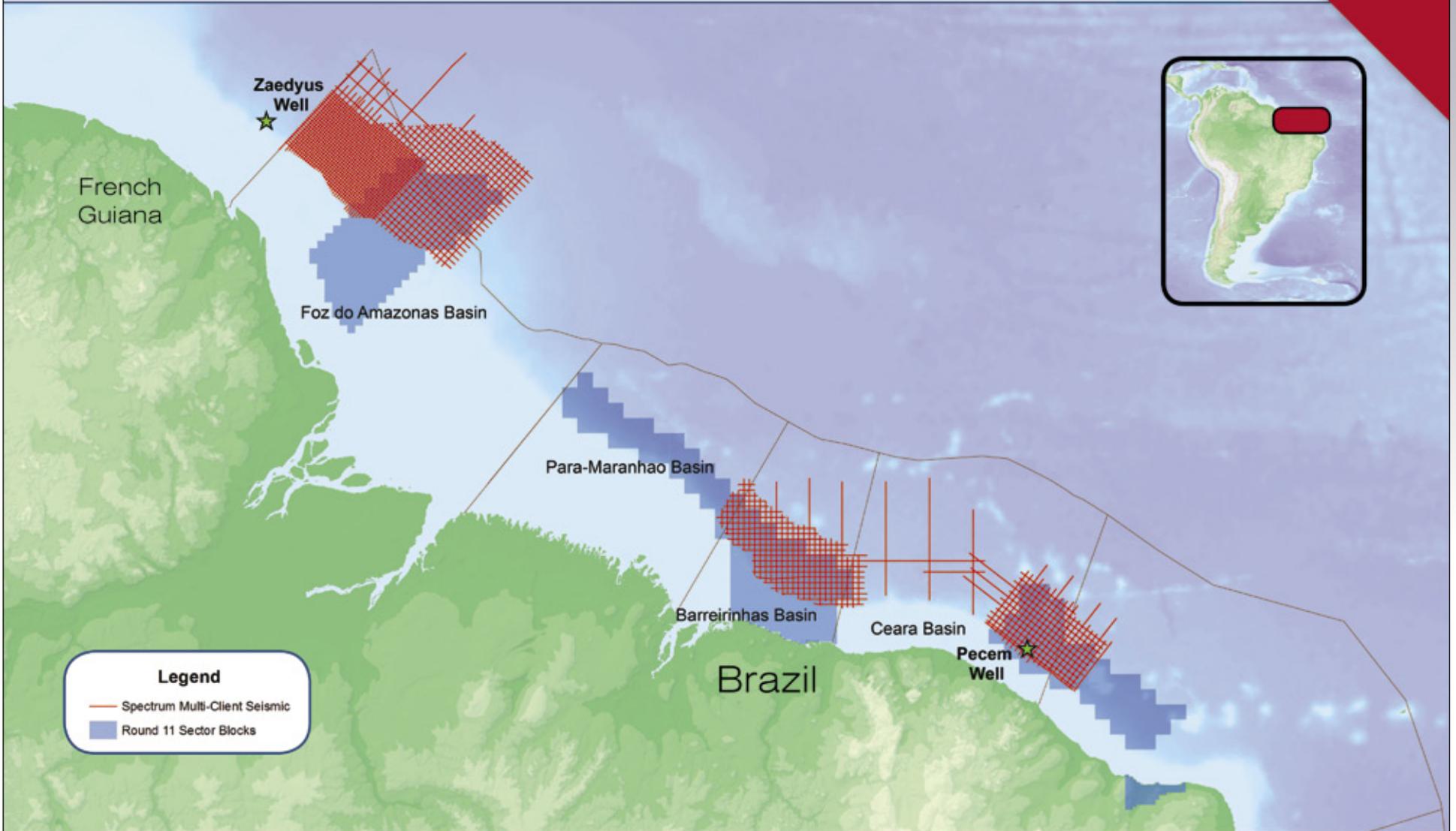
Leading the way with customer-driven data, integrated software and services for your upstream decision-making needs.

geoSCOUT | gDC | petroCUBE at www.geoLOGIC.com

See us at
SEG 2012
booth #966

Equatorial Margins Brazil

Multi-Client Seismic - Amazonas, Ceara and Barreirinhas Basins



Canyon Features from Foz do Amazonas Survey (Phase I)

Spectrum is active in three basins along the Equatorial Margins of Brazil. Our PSTM data is now available for each of the Ceara, Barreirinhas and Foz do Amazonas phase 1 surveys.

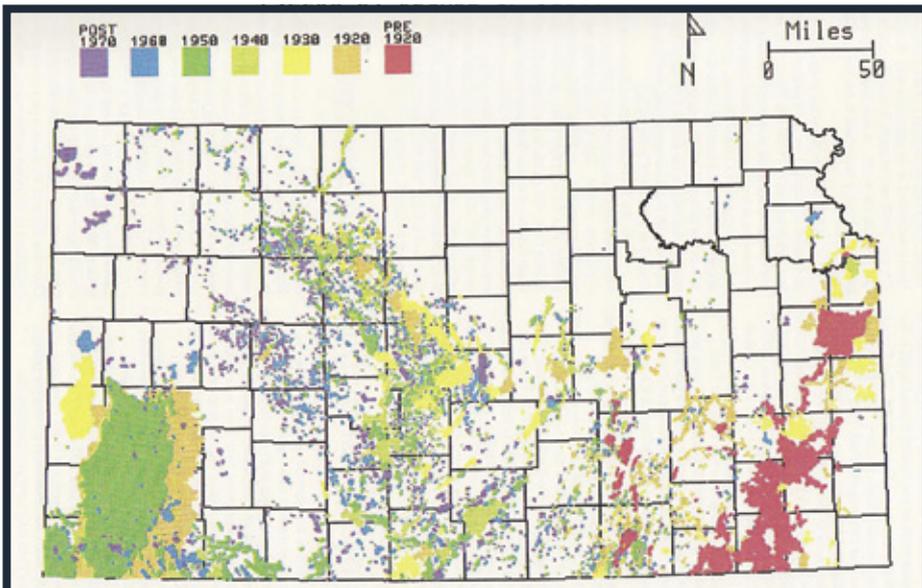
Spectrum has also commenced the next phase of its Foz do Amazonas program, which will acquire an additional 6,000 km over this basin.

Following completion of this new survey Spectrum will have collected over 34,000 km of new, long offset data over these highly perspective areas.

All of these surveys have been acquired with 10,000m offsets and 13 second record lengths. Companies participating in Spectrum's new seismic programs will have a competitive advantage in the upcoming Round 11 in 2013.



+1 281 647 0602
mc-us@spectrumasa.com
www.spectrumasa.com



Fields by decade of discovery, Kansas Geological Survey Subsurface Geology Series No. 9, 1987.

Kansas from page 44

interested in Kansas.

He caught the attention of James Guffey and John Galey, oil producers and promoters who accompanied him back to Kansas, where they shot the Norman well with 30 quarts of nitroglycerine.

Results pleased Guffey and Galey sufficiently for them to lease all available land in the Neodesha area and drill 15 wells during the summer of 1893. That year, Kansas reported oil production of 18,000 barrels.

In 1895, Guffey and Galey (who would later be called “the greatest wildcatter in oildom” because of his role in the Spindletop discovery) sold their Kansas holdings to Forest Oil Company, a Standard Oil subsidiary, and moved

on. Forest continued to drill, and in 1896 Standard Oil of Kansas was organized. Its operations were limited to refining, a business sorely lacking in Kansas. The refinery began operating in 1898 and, in anticipation, state oil production jumped to 113,500 barrels.

With an available refinery, oil production boomed in eastern Kansas. The Independence field boasted some 1,000 BOPD wells. The state production in 1905 climbed to 3.75 MMBO. During the early 20th century, Standard Oil monopolized transportation and refining in Kansas, and its low prices resulted in fewer than 100 wells drilled between 1907 and 1910.

Federal intervention using antitrust laws reined in the Standard monopoly and state production grew again after 1911.

By 1914 interest was growing in Cowley and Butler counties in south central Kansas – a few positive finds had been made, but nothing exciting.

Henry Doherty, founder of Cities Service in 1910, was seeking new gas reserves and opted for scientific exploration in lieu of wildcatting. He hired Charles N. Gould and Everett Carpenter in Oklahoma and sent them to Augusta, in Butler County, Kan. There, they mapped some prominent anticlinal structures in Permian age limestone. During 1914, drilling began on several selected sites – and nearly all found commercial volumes of gas.

A well on the Varner lease near the town of Augusta showed weak gas production, but even it contained oil.

During 1915, 11 more wells in the area were drilled – one flowing oil with initial production of 1,500 BOPD.

El Dorado, an aptly named town 15 miles northeast of Augusta, had unsuccessfully searched for hydrocarbons since the 1890s. In 1914, the city hired Erasmus Haworth, the state geologist and University of Kansas geology department chairman, to explore their area. He mapped a large anticline on the same formations used by Gould and Carpenter at Augusta and selected a site that proved to be a dry hole.

Wichita Natural Gas, a Cities Service subsidiary that became Empire Oil and Gas, then bought the town’s 790 leased acres for \$800, remapped the area verifying Haworth’s work and began drilling in late September 1915. They found commercial oil within a week, and by the end of 1916 the field contained about 600 wells with combined production exceeding 12,000 BOPD.

During 1917 Empire completed 1,000 wells in the El Dorado field. During 1917-18 the field had five wells, each of which was producing more than 15,000 BOPD. During 1918, the El Dorado produced 28.8 MMBO –nearly 8.6 percent of total U.S. oil production. As of 2011, the El Dorado Field has produced a total of 307.77 MMBO.

The Hugoton

By 1920, any commercial oil or gas production in Kansas remained east of the Sixth Principal Meridian.

In March 1919, the Defenders Petroleum and Traders Oil and Gas Company spudded the No. 1 Boles near Liberal, Seward County, in southwestern Kansas. A good gas show was present – but with no market. The Boles sat idle until 1922, when it was completed as a gas well with an open flow of five million to 10 million CFGPD.

The Boles is the discovery well for the giant Hugoton gas area.

See Hugoton, page 48

**BECAUSE YOU WANT
TO GIVE YOUR FAMILY
FINANCIAL PROTECTION...
AND YOURSELF
PEACE OF MIND.**



AAPG’S GEOCARE BENEFITS INSURANCE PROGRAM. A WIDE RANGE OF AFFORDABLE COVERAGES BACKED BY EXCEPTIONAL SERVICE. Wouldn’t it be great if you had access to a full range of quality insurance plans, available at affordable group rates and backed by a commitment to providing you with exceptional service? You do. That’s what AAPG’s GeoCare Benefits Insurance Program is all about. Whether you need health, life, disability or a variety of supplemental plans, GeoCare Benefits can help meet those needs. And, every plan has been researched, approved and endorsed by AAPG’s Committee on Group Insurance. GeoCare Benefits. It’s insurance you can trust.

AAPG’S GEOCARE BENEFITS INSURANCE PROGRAM. QUALITY, AFFORDABLE COVERAGE FOR YOUR FAMILY. PEACE OF MIND FOR YOU. CALL 1-800-337-3140 OR VISIT US ON THE WEB AT WWW.GEOCAREBENEFITS.COM FOR MORE INFORMATION, INCLUDING FEATURES, ELIGIBILITY AND RENEWAL PROVISIONS, EXCLUSIONS, LIMITATIONS AND RATES.

GeoCare Benefits Insurance Program, P.O. Box 9159, Phoenix, AZ 85068-9159, Email: geocarebenefits@agia.com. The Group Plans—AD&D, Disability, Health, In-Hospital, and Life—are underwritten by New York Life Insurance Co. (51 Madison Ave., New York, NY 10010). Coverage is subject to approval by New York Life. The Medicare Supplement Plans are underwritten by Transamerica Life Insurance Company, Cedar Rapids, IA; and in NY, Transamerica Financial Life Insurance Company, Harrison, NY. The Cancer Expense Plan is underwritten by Monumental Life Insurance Company, Cedar Rapids, IA. Transamerica Life Insurance Company, Transamerica Financial Life Insurance Company, and Monumental Life Insurance Company are AEGON companies.



16106352



Because the solution is within our grasp.

ConocoPhillips is a company of many resources, and we're leveraging our strength in new ways. We're a company with innovators who are ready to meet the world's energy needs in exciting new ways.

You will:

- Play an active role in determining your career path, working in a rewarding, collaborative environment
- Maintain a positive work-life balance at a company that encourages working hard and playing hard
- Have opportunities for continuing education and professional development, supported by proactive mentorship
- Enjoy the best of both worlds in a career that combines the stability of a global company with the agility of an independent

Available positions include:

- *Domestic L48 Unconventional Exploration Geoscientist*
- *Gulf of Mexico Exploration Geologists/Geophysicists*
- *Gulf of Mexico Operated Assets Geologist/Geophysicist*
- *Gulf of Mexico Pore Pressure Geologist/Geophysicist*
- *Gulf of Mexico Exploration Maturation Geologist/Geophysicist*
- *International Unconventional Exploration Geologist/Geophysicist*
- *International Exploration Geochemist*
- *Exploration Petrophysicists*
- *Exploration Seismic Stratigrapher*
- *Well Operations Geologist*
- *Petroleum System Analyst*

ConocoPhillips

conocophillips.com/careers

We're looking for people who look harder.
CPGeoJobs.com/AAPG



© 2012 ConocoPhillips Company. All rights reserved. EOE.

Kansas Oil Potential Once Again Drawing Attention – And Questions

By KEN MILAM, EXPLORER Correspondent

The notion made headlines in Kansas. Earlier this year city officials in Wichita were told by “experts” that the site of a planned new library might be a good place to look for oil.

People were intrigued; After all, oil wells have been drilled in Wichita and the surrounding area since the 1890s (see related story, page 44), and some are still producing.

Other oil industry experts, however, are less optimistic that the city is sitting atop a revenue gusher.

Rex Buchanan, acting director of the Kansas Geological Survey, was quoted in one of the first news stories.

The library site is on the Arkansas River, and, “The reporter had been told

that along rivers is a good place to find oil.”

“I said oil is found along rivers – oil is also found away from rivers,” Buchanan said.

“I, along with probably the majority of other geologists in town, don’t think there’s anything to it,” said Larry Skelton, a former assistant director at the KGS.

Former AAPG president and longtime Wichita resident Bob Cowdery generally agreed, and said city officials should be wary of speculators trying to raise money for questionable ventures.

City officials were quoted as saying they were exploring the possibilities, and any drilling would not delay the construction project.

Going All the Way

The late-1800s, city-owned “gusher” near 15th and Broadway (about a mile from the library site) is a local legend that Skelton characterized as a “total farce.”

“It was a cable tool rig, of course, and anything that could go wrong with a well went wrong with that one,” he said.

“There were oil fields there,” Skelton added. “I just don’t think there are any prospects today.”

Some of the fields in the area trend northeast to southwest, while the Arkansas River trends northwest to southeast – “so they cross,” he said.

“There are still some active wells in the Wichita Field,” he said.

Two wells on the north side of town

produced 630 barrels in 1995, he said.

The Robins Field, several miles south of downtown, was discovered in the 1920s, and produced 5,300 barrels from 23 wells in 2011, Skelton said.

Sedgewick County had 126 operating wells in 2011, which produced 122,000 barrels – “about a thousand barrels per well per year, many in old fields,” he said.

“I’ve talked to several Geological Society members,” Skelton said, “and the consensus is, if there’s anything there, it’s not going to be much.”

But for geologists, he conceded, the notion of a well remains intriguing.

“It would be nice to have a well to see what’s there,” he said, “if they go all the way to the basement.”



With reservoirs becoming increasingly complex, you need the most accurate information you can get to better understand your reservoir.

Weatherford Labs helps you get more from your core by combining an unsurpassed global team of geoscientists, engineers, technicians and researchers with the industry’s most comprehensive, integrated laboratory services worldwide. From core analysis, sorption, geochemistry and isotopic composition to detailed basin modeling and comprehensive data packages, we provide you with real reservoir rock and fluid information that hasn’t been distilled by a simulator or iterated by software.

We call it “**The Ground Truth™**” – giving you the accurate answers you need for better reservoir understanding. You’ll call it a better return on your reservoir investment. To learn more, contact TheGroundTruth@weatherfordlabs.com.



Hugoton from page 46

There were no pipelines in the region, however, so the Boles was plugged – and there was no other activity in the region until 1927, when W.M. McNab and the Independent Oil and Gas Co. drilled and completed the No. 1 Crawford near Hugoton in Stevens County, for about six million CFGPD.

A year later five more wells had been drilled and pipelines were being installed locally and as far as Denver. By the late 1930s, Hugoton gas was piped as far east as Pennsylvania and west to Los Angeles.

The Hugoton and its associated fields would become “the largest natural gas field in North America and the second largest in the world.”

Oils Well That Ends Well

Meanwhile, wildcatters had been busy elsewhere in western Kansas.

In August 1923, M.M. Valerius spudded the Carrie Oswald No. 1, about two miles from Fairport, Russell County, Kansas. On Thanksgiving Day the well came in at about 175 BOPD. (The local bank had been prepared to foreclose on the Oswald farm the next day.)

This was the discovery well, and was about 120 miles west from the nearest production in Marion County.

The next three years saw approximately 100 more wells drilled in Russell County’s Fairport field. The Fairport discovery convinced many majors and independents to move in, and by 1928 wells were being drilled throughout what had been previously thought to be barren territory.

Research and exploration continued to find oil and gas in this 150-year-old province, which as of 2011 has produced nearly 6.4 billion barrels of oil and 39.3 billion mcf of natural gas – and has more of both to find.

Lawrence “Larry” Skelton, now retired and residing in Wichita, Kan., had a 25-year career with the Kansas Geological Survey as an assistant director managing its Wichita operations. He is a past president and an honorary member of the Kansas Geological Society; past president and treasurer of the Kansas Academy of Science; and was awarded the Rocky Mountain Federation of Mineralogical Societies Distinguished Achievement Honorary Award in 2001 and the AAPG Public Service Award in 2002.



There at the beginning. Here for the future.

When you think of petroleum engineering and petroleum geology/geophysics programs, the University of Oklahoma's Mewbourne College of Earth & Energy might be the first college that comes to mind, and it should be.

- Home to the world's first school of Petroleum Geology, granting the first degree in 1904
- Home to the world's first school of Petroleum Engineering
- Alma mater to more petroleum engineers and petroleum geologists than any program in the world
- OU is alma mater to eight Society of Petroleum Engineers (SPE) past presidents, eight American Association of Petroleum Geologists (AAPG) past presidents and five Society of Exploration Geophysicists (SEG) past presidents.

www.ou.edu/mcee

MEWBOURNE
COLLEGE OF EARTH & ENERGY
THE UNIVERSITY OF OKLAHOMA



Real education for the real world.

Big Crowds, Top Technical Program Stirs the ICE

By VERN STEFANIC, EXPLORER Managing Editor

By any matrix you can name, the recent AAPG International Conference and Exhibition in Singapore was a success – and in some cases, a success that surprised.

The most obvious surprise was the number of those attending the first-ever ICE held in Singapore: The final registration tally was 2,122, making it the fifth largest ICE in AAPG history.

That number included attendees from 62 countries – further evidence of AAPG's growing global presence – with Asia/Pacific and European regions providing most of the participants. Twelve percent of the attendees were from the United States.

"We were all pleasantly surprised with the number of onsite registrations," said ICE general chair Richard Lorentz. "Singapore being an island nation, with no significant oil and gas industry. We expected this number to be low – but in the end it was the onsite registration that tipped total registrants over 2,000. This was terrific."

The meeting itself – including the special forums and overall quality of the technical session – was another success story for the organizing committee.

"We had very high expectations, but even with the bar set high we feel it (ICE) surpassed our expectations," Lorentz said. "The terrific technical program and the wonderful venue proved to be a winning combination."

Lorentz specifically recalled the special sessions that were dedicated to the late geologist Charles Hutchinson.

"The Hutchinson special forum was terrific," Lorentz said, "and we were all



AAPG President Ted Beaumont, speaking at the opening session of the recent AAPG International Conference and Exhibition in Singapore ...



surprised with the quality and amount of new research that was presented.

"The student events were all special," he added, "and very well attended."

There were several highlights that could be cited, including:

▶ The opening session, emceed by Lorentz, introduced a taste of Singapore's

culture and industry (via a colorful "Dancing Lion" performance), and featured remarks from Lee Tzu Yang, chairman of the Shell Companies in Singapore, and AAPG President Ted Beaumont, who spoke about the industry's challenges and potential for success with his talk, "The Unconventional Black Swan Event."

▶ The plenary session, moderated by Scott Tinker, on "The Unconventional Resources Energy Revolution – Is Asia Pacific Next?" drew a large number of participants for its entire presentation.

▶ Ian Longley's special lecture, "The Secrets of a Successful Geological Career in Modern Western Oil Companies," drew a large number of participants and became the talk of the conference – it was informative, irreverent and totally entertaining.

▶ The large and often dazzling exhibits hall boasted 91 exhibitors and 16 countries in the International Pavilion.

Even the judging of technical presentations brought some surprising success.

"We are particularly pleased with our new approach to judging and presentation of the best paper and poster awards on site (see related story, page 30)," Lorentz said. "Judge scoring, which is generally a thankless job, was done live and we were able to present the 'best' awards at the event during the closing sundowner.

"I have to say," he added, "seeing the students accept their best paper award in front of their peers was terrific."

The next ICE will be held Sept. 8-11 in Cartagena, Colombia. ☐

LEARN • EXCHANGE • ACHIEVE • PROMOTE

FORUM



DIG DEEPER WITH THE EXPERTS

PLAYMAKER FORUM

24 January 2013 • Houston, TX

FORUM GOAL:

The AAPG Playmaker Forum (organized by its Division of Professional Affairs) will focus on elements, commercial and scientific/technical, required to successfully mature prospects from first insight, leasing, marketing, to discovery. It will focus on necessary skills you can use right away for prospecting, play generation, deal screening and important aspects of professional career development.

Play Maker Keynote Luncheon: The luncheon will feature a legendary industry play maker discussing a successful play of significant interest to the attendees.
Play Maker Forum: The afternoon session will include five talks on Plays of the Day by individuals with critical insights into discovery, creation, and expansion of established and emerging plays. The speakers would represent unique perspectives, geologic overviews, and business analysis, including several of the following domestic onshore plays: Bakken, Marcellus, Eagle Ford, Mississippian and other emerging play(s).

ATTENDANCE FEES:

Includes: course notes, heritage of petroleum geologist publication, continuing education credits, luncheon, two networking breaks, reception.

\$295.00	DPA Member (AAPG Young Professional or HGS Neo Geo)
\$325.00	AAPG or Affiliated Society Member
\$375.00	Non members

MISSISSIPPIAN LIME FORUM

31 January 2013 • Oklahoma City

FORUM GOAL:

The Mississippian Lime Forum will feature presentations designed to be extremely helpful for geologists, geophysicists, and engineers currently working in the Mississippian Lime plays in Kansas and Oklahoma. The forum will seek to help develop a deeper, more integrated understanding of the reasons for productivity in the play.

WHAT IS THE STRUCTURE OF THE EVENT?

The "Forum" is a new format for the AAPG, which encourages in-depth presentations by practicing experts on topics that have immediate bearing on success in exploration, development, and operations. The goal is to maximize knowledge transfer by encouraging lively interaction and thoughtful consideration of the experts' findings, experience, and insights. Presentations will be 60-90 minutes, which allows an in-depth look, and there will be ample time given for questions and discussion. All participants will have the opportunity to take a "test your knowledge" quiz over the content, and to obtain AAPG Continuing Education Units and professional development hours.

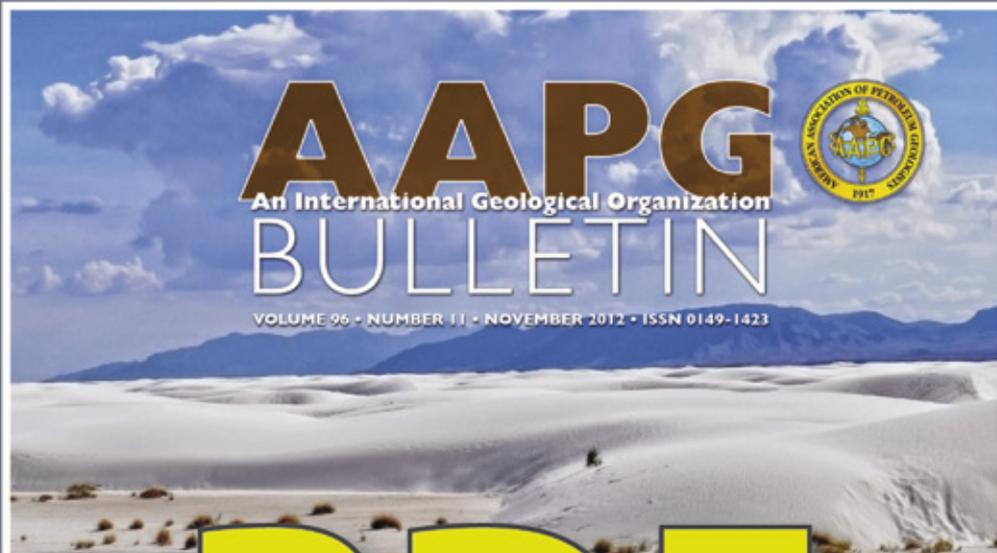
ATTENDANCE FEES:

Includes: course program, course presentations, articles and "test your knowledge" quizzes, continuing education credit, luncheon, two networking breaks, reception.

\$395.00	AAPG or Affiliated Society Member
\$425.00	Non members

FOR DETAILS CONTACT EDUCATE@AAPG.ORG

DOWNLOAD Your NEW November 2012 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.

The link below takes you to the Members Only login page where, with a few key strokes, you can click on a link for the Bulletin Online, the current issue, or for the Bulletin Archives, all issues of the Bulletin to date. Online as searchable html and .pdf files, the current issue is always available by the first of every month.



Members may access the AAPG Bulletin online at: www.aapg.org/november_bulletin



Also, submit your next paper for consideration via www.aapg.org/bulletin.

Article highlights include:

Cements damage fracture conduits

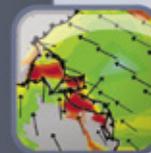
Lianbo Zeng, Xiaomei Tang, Tiecheng Wang, and Lei Gong



Fractures in the lacustrine carbonates of the Qaidam Basin, northwest China, are small and steeply dipping faults, bedding-plane slip faults, and subvertical opening mode fractures. The degree of fracture filling determines the effectiveness of fractures as fluid conduits and the distribution of high quality reservoirs.

Dynamic earth models

Sonja Spasojevic and Michael Gurnis



Dynamic earth models provide improved understanding of the effects of mantle dynamics on subsidence, uplift, and tilting of continents. Movement of continents causes dynamic subsidence and uplift, controls regional sea level, and has important implications for petroleum systems.

A new Jurassic paleogeographic model

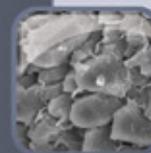
Daniele Masetti, Roberto Fantoni, Roberta Romana, Dario Sartorio, and Enrico Trevisani



The excellent correlation between surface and subsurface data in the eastern southern Alps has resulted in the stratigraphic revision of the successions that characterize these paleogeographic units. This study updates the pioneering works of the 1970s and 1980s.

Experiments provide new information

Joanna M. Ajdukiewicz and Richard E. Lares



Coat clay particles inhibit cement growth by forming barriers to early-overgrowth coalescence. They preserve porosity at depth by limiting cement growth rather than inhibiting quartz-cement nucleation. In deeply buried sandstones, quartz cement can significantly affect microporosity.

AAPG 2012 ICE



AAPG AND SAEPEX WISH TO EXPRESS THEIR APPRECIATION TO THE SPONSORS WHO HAVE GENEROUSLY SUPPORTED THE PETROLEUM GEOLOGY COMMUNITY AND THE AAPG 2012 INTERNATIONAL CONFERENCE & EXHIBITION IN SINGAPORE.

DIAMOND



Registration, Technical Program & Registration Announcement



Conference Amenity, Oral Sessions, Poster Sessions, Student Registration Assistance



General Fund



Abstracts, General Fund, Student and Faculty Lounge, Student Registration Assistance

PLATINUM



Cyber C@fé, Oral Sessions, Poster Sessions



General Fund



Conference Amenity



Featured Speaker Luncheon, Pocket Guide, Student Registration Assistance



Badge Cords/Lanyards, Student Field Trip and Short Course Registration Assistance, VIP Reception



Directional Signage, Student Registration Assistance

GOLD



General Fund, Icebreaker Reception, Volunteer Support



Program Book, Student Reception



Exhibit Hall Refreshments and Receptions



Presenter Gifts, Presenter Support



General Fund, Oral Sessions, Presenter Support



Student Travel Assistance

SILVER



Oral Sessions, Poster Sessions



Icebreaker Reception



Icebreaker Reception



General Fund, Notebooks, Student Field Trip and Short Course Registration Assistance, Student Registration Assistance



General Fund, Oral Sessions



Icebreaker Reception



Icebreaker Reception

BRONZE



General Fund



Student Registration Assistance



General Fund



General Fund



Presenter Gifts

PATRON

Ricoh (Singapore) Pte Ltd – Student Field Trip and Short Course Registration Assistance • Subsurface Consultants & Associates, LLC – VP Lunch Tickets
Sembcorp Gas Pte Ltd – Student Registration Assistance

MEDIA SPONSOR: **Worldoils**

THANK YOU AAPG 2012 ICE SPONSORS

Waveform Classification Proves Itself a Valuable Tool

By SATINDER CHOPRA

The shape and character of the seismic waveform is often used to characterize reservoir quality. This is because the seismic waveform carries information about the phase, frequency and amplitude – and any variation in these parameters is considered reflective of the lateral variations in lithology, porosity and fluid content.

If the shape and character of seismic waveforms in a given target zone can be studied using some pattern recognition type of a process, and then displayed in a map view, the display would indicate seismic facies variation at the target level.

One approach to pattern recognition is with the use of neural networks to compare seismic waveforms and group them into different classes.

Under this approach two types of methods could be distinguished, namely *unsupervised* and *supervised* classifications.

In the unsupervised method – apart from defining an analysis interval – no other *a priori* information is used for the classification of seismic traces into groups or classes. The supervised method uses the known information available at specific well locations for the classification process.

In this article, we discuss the unsupervised approach.

* * *

There are two steps to the process in the

unsupervised classification:

► As the first step, all the traces within the interval of interest are analyzed using a neural network, and a series of synthetic traces (according to the user-defined number of groups) are generated that best represent the different shapes in the interval.

These synthetic traces are arranged in a progression (assigning numbers to these traces), which is examined to get a feel for the shapes of the waveforms.

► As the second step, each trace in the interval is compared with the different synthetic traces and those traces that have maximum correlation with a given synthetic trace are classified into a group.

The resulting map is essentially a facies map, which itself is essentially a similarity map of the actual traces to the different synthetic traces.

The seismic facies so generated also can be overlaid on a vertical seismic section to study their lateral variation. Evidently, this method does not require any input in the form of any well log or any guidance about where the character divisions should occur.

Once a seismic facies map is generated using unsupervised waveform classification, it is possible to apply the process again to individual classes. In that sense, the process is *hierarchical* and subdivides each class into smaller subsets. Iteratively applying it enhances the resolution of each class.

The Geophysical Corner is a regular column in the EXPLORER, edited by Satinder Chopra, chief geophysicist for Arcis Seismic Solutions, Calgary, Canada, and a past AAPG-SEG Joint Distinguished Lecturer. This month's column deals with seismic waveforms and facies classification.

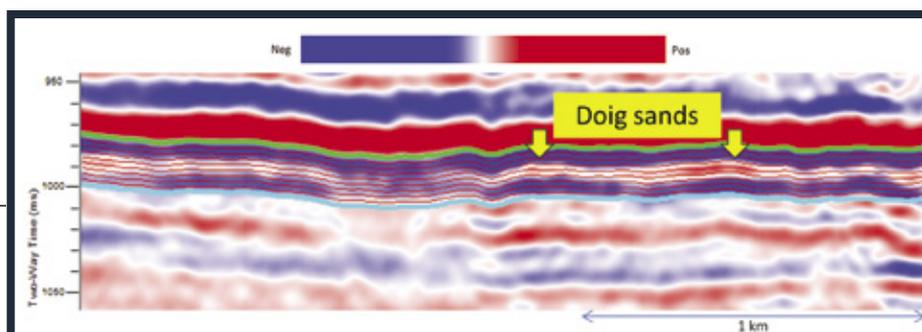


Figure 1 – A segment of a seismic section shows the signature of the Doig sandstone as high positive amplitudes. To isolate the sand zone the upper horizon is picked, which looks quite smooth. The lower horizon, peak, trough or zero crossing if picked, however, looks quite haphazard and does not yield a consistent slab of waveform data that could be used to run waveform classification. The upper horizon is used to generate the lower horizon by adding 24 ms to it. The interval between the two horizons is divided into 10 parallel horizons.

We discuss these two processes in the following application.

* * *

Western Canada's Middle Triassic Doig Formation is composed of argillaceous siltstone and calcareous shale. It is unconformably overlain by the Halfway Formation and itself overlays the Montney Formation. It is seen to occur in northwestern Alberta, northeastern British Columbia and southern Yukon provinces of Canada.

While the maximum thickness of the Doig Formation reaches over 180 meters in the foothills of the Rocky Mountains, it thins out to the north and the east.

Within the Doig Formation, thick sandstone bodies occur within the shale, and many of them are found to be economic hydrocarbon reservoirs – hence the attraction for their exploration and development.

Examination of the available core from

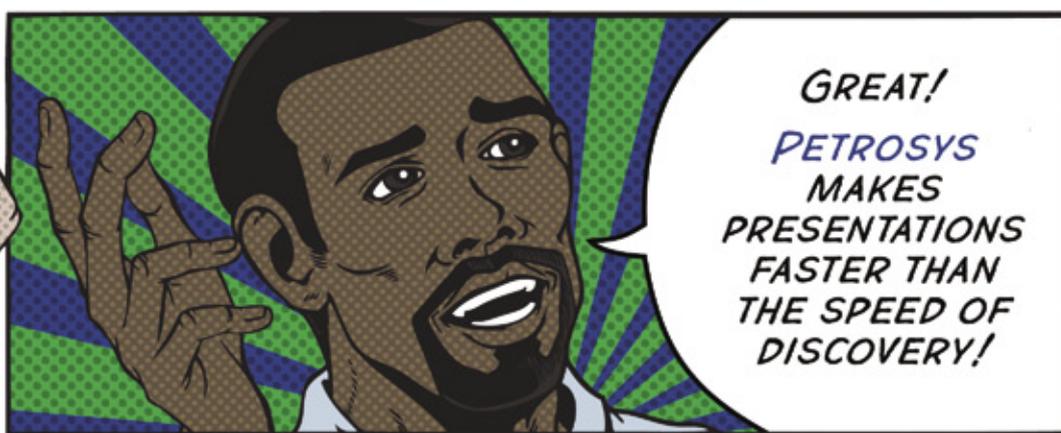
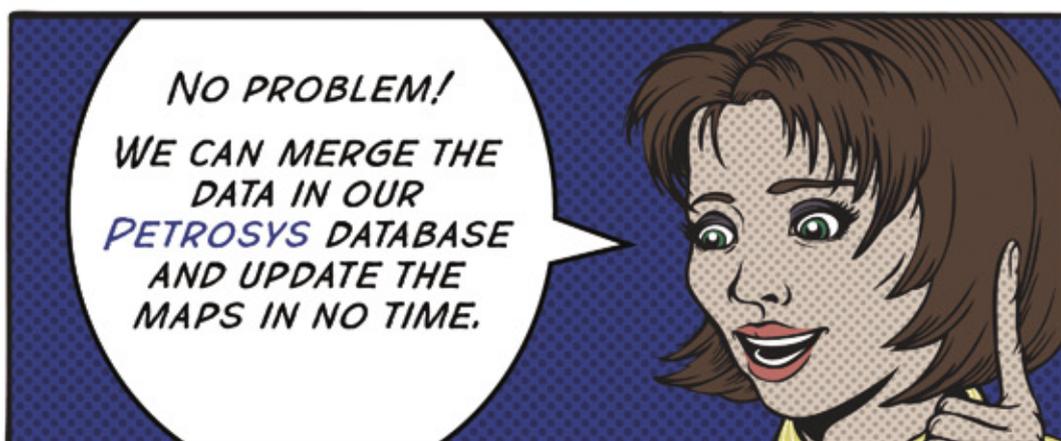
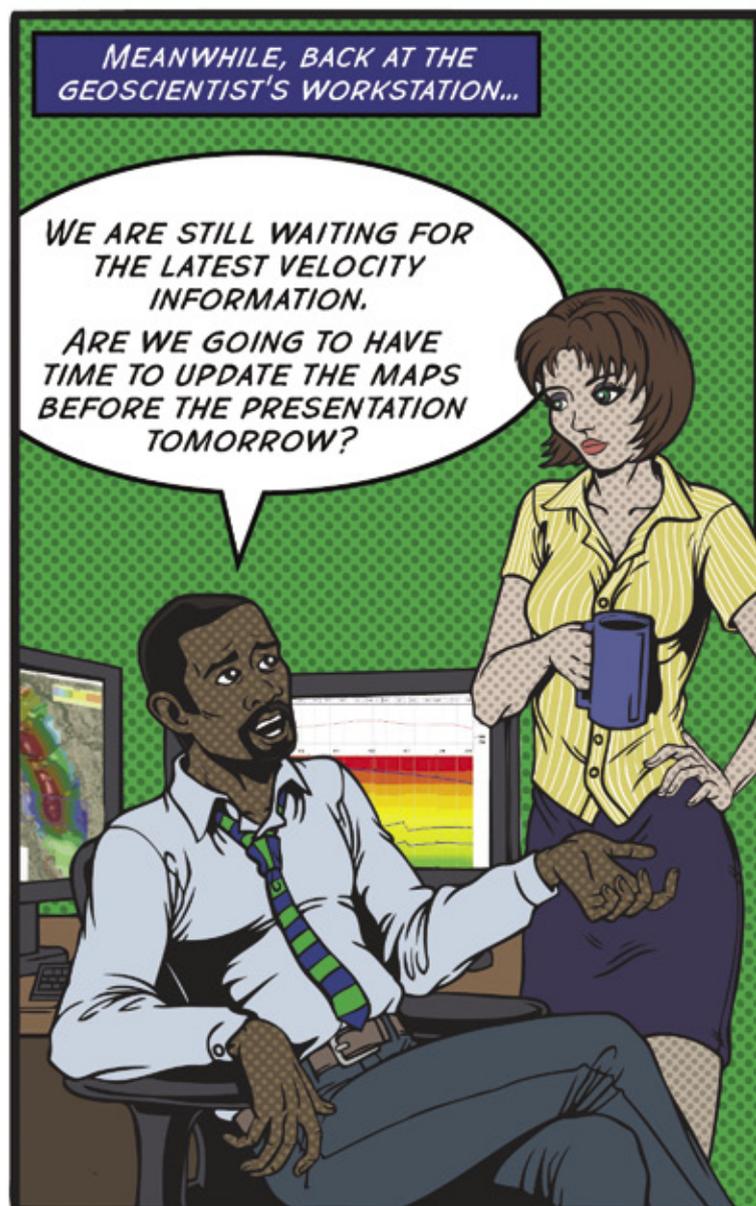
the Doig sandstone reservoirs suggests an association between sedimentary facies such as shoreface, offshore transition and offshore/shelf. Phosphates and other accessory minerals in the Doig sandstone bodies can drive the gamma ray tool response and mask the sands, so correct identification of the bodies on logs requires multiple curves. The facies change quickly in both the vertical and the horizontal directions.

Recognition of these facies changes and characterization of the Doig sandstones serves as a useful input for exploration and development purposes.

In figure 1 we show a segment of a seismic section from a 3-D volume from northeast British Columbia. After correlation with the available log control, the Doig sandstone signature was located on the seismic data and is indicated with yellow arrows.

These high amplitude events seem

Continued on next page



WWW.PETROSYS.COM.AU/STAYTUNED

 **PETROSYS**

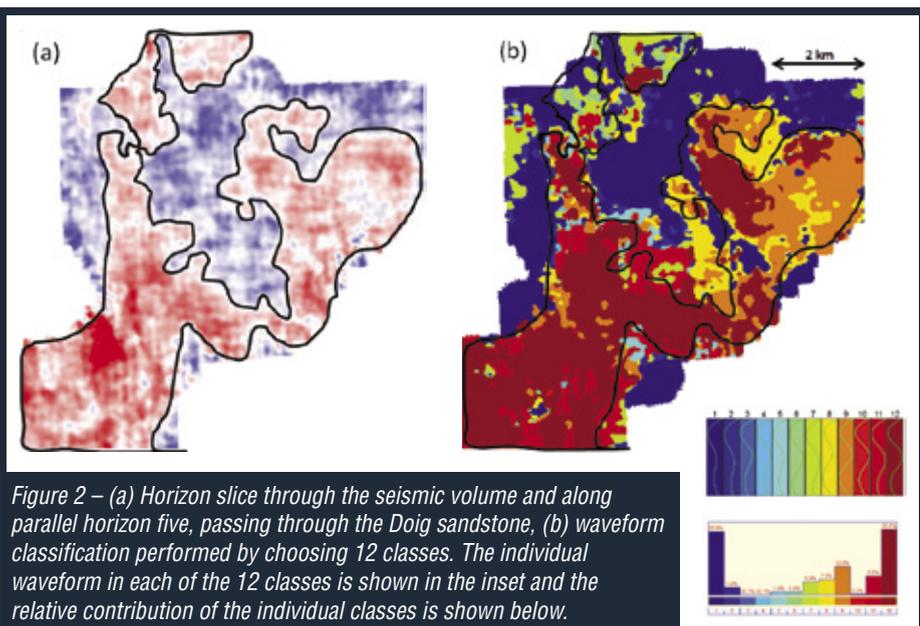


Figure 2 – (a) Horizon slice through the seismic volume and along parallel horizon five, passing through the Doig sandstone, (b) waveform classification performed by choosing 12 classes. The individual waveform in each of the 12 classes is shown in the inset and the relative contribution of the individual classes is shown below.

Notice, the facies map in figure 2b shows a variation in terms of the colors, but the overall facies pattern seems to follow the sand boundary overlaid on it.

Realizing that the number of classes chosen may not have yielded an optimum facies variation, we next decided to adopt the *hierarchical waveform classification*.

We begin with four classes and the facies variation is shown in figure 3a.

On this display we notice that cyan and yellow colors do not represent the Doig sands of interest – but the blue and red colors do. So, next, we sub-divide these two colors and the results are shown in figure 3b.

Notice, this display shows an even distribution to all the colors within the sand boundary, and so a reasonable facies variation.

Seismic waveform classification thus represents a useful tool for studying the facies variation within an amplitude map representing a particular lithology or different lithologies, which happens to be the Doig sandstone in this case.

This classification represents a qualitative way of extracting useful facies variation. More work needs to be done in such cases to ascertain the authenticity of such facies variations and their correlation with the available well log control.

Such works will form the basis for similar articles in the future issues of the GeoCorner.

I thank James Keay for useful discussions with regards to the geological description of the Doig sands, and I also thank Arcis Seismic Solutions for permission to present this work.

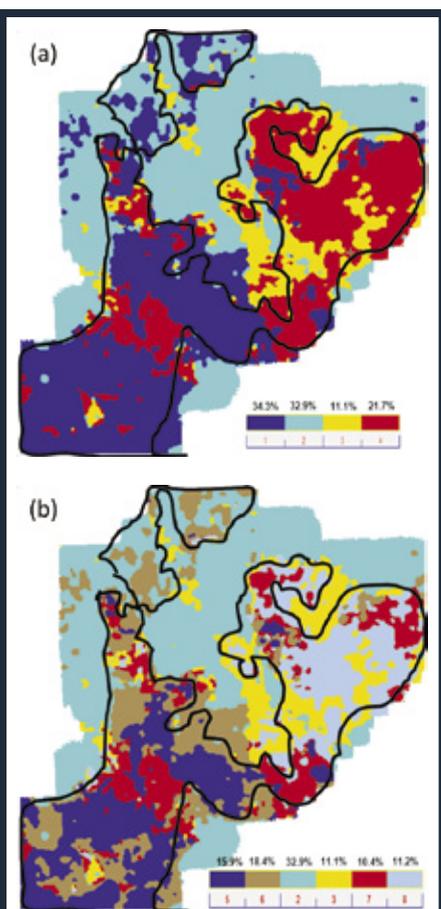
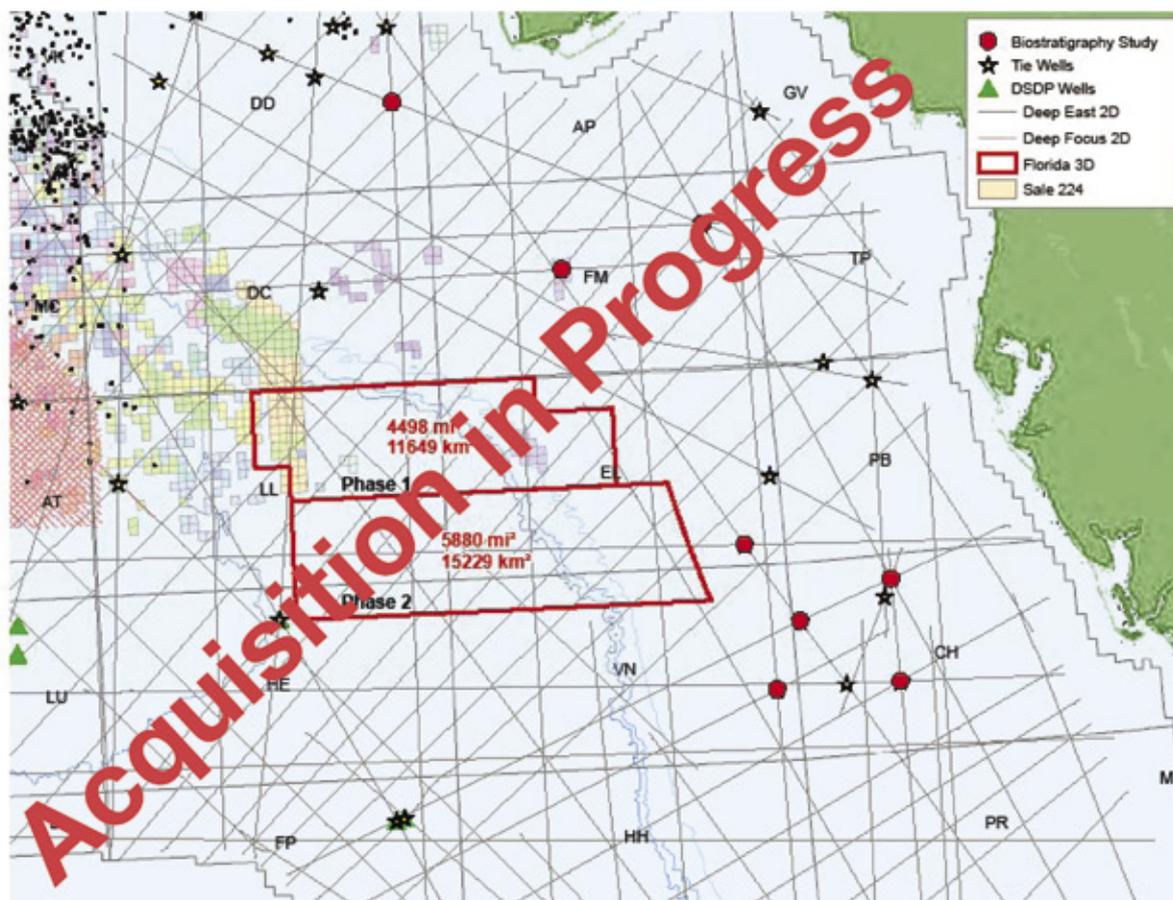


Figure 3 – Waveform classification map generated by (a) using 4 classes; (b) subdividing classes 1 and 4 in (a). Notice the higher level of detail that is seen in (b) as compared with (a), within the sandstone boundary drawn in black.

WHEN FLORIDA COUNTS...



...COUNT ON **FUGRO**

Ask us About the Florida Debut

Meet us at:
SEG
 4-7 November 2012
 Fugro Booth # 1945

Fugro Multi Client Services, Inc.
 Tel: (713) 369-5859
 Email: mhouston@fugro.com
 www.fugromulticlient.com



Continued from previous page

isolated, but appear to have a deposition pattern on the horizon slice shown in figure 2a. Their deposition outline has been traced in black, as indicated.

Next, to study the facies variation exhibited by the sandstone, the upper horizon (in green) was tracked as the zero crossing event. For selecting the interval covering the seismic signature, the lower horizon was not picked as it was not a continuous and a smooth marker. Therefore, the upper horizon was used to generate the lower horizon by adding a constant 24 ms to it. This gives a consistent slab of waveform data bounded by the green and the cyan horizons, around the signature of the Doig sandstone and comprising a peak in between two troughs.

For performing waveform classification, the *a priori* specification of the number of desired classes was chosen as 12. The different classes with their color codes are shown in the inset next to figure 2b, and the shapes of the individual waveforms in the inset above.

Industry technology has a cultural impact

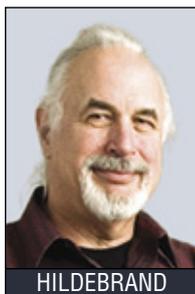
From Rocks to Rock, His Ideas Sound Good

By KEN MILAM, EXPLORER Correspondent

Who is Harold Hildebrand and why are people saying such weird things about him (at least about his creations)?

For example:

As a co-founder of Landmark Graphics in the 1980s, "Dr. Andy," as he is widely known, is praised for helping move seismic interpretation to the desktop and reshaping exploration economics in the process.



HILDEBRAND

Then, in the 1990s, Hildebrand applied his knowledge of autocorrelation, digital signal processing and seismic deconvolution to (what else?) music.

The result was Antares Technologies and a gizmo called Auto-Tune, which has become pervasive, if not indispensable in the music industry.

It's also been called pure evil. Because of that creation, Hildebrand is

hailed by some as an innovator who helped reshape the workings of the recording industry – and accused by others as the guy who, to put it politely, totally messed up the industry.

The truth might be in the ear of the beholder.

Auto-Tune is a plug-in that can tweak a singer's missed notes to be pitch perfect, while maintaining the original vocal quality, both in the studio and live performances.

"The real value is, we've changed the economics of the studios," he said.

"In the past, a singer would make multiple takes of the same phrase or same song, then the engineer would slice them up and piece together the song from different takes.

"Now they can sing it twice, take half an hour, and the engineer can fix the problems. It's dramatically more efficient – better quality and less expense," he said.

"It's opened up opportunities for many people," he added.

And singers aren't the only ones to benefit from the technology. Antares' newest big product, unveiled in January, allows real-time pitch correction for guitar players.

Some stars eschew Auto-Tune, saying it is dishonest. Others say it's a safety net that helps them give audiences the performance they deserve. Still others – Cher and T-Pain are two examples – jack the settings around to create an extreme effect that's been likened to a robot voice or singing into a fan.

Such extreme use "is faddish, and fads get overexposed," Hildebrand said.

"I explain, I just build the car, I don't drive it down the wrong side of the freeway.

"We enjoy the controversy," he admitted.

Crossover Success

So how did Hildebrand get from rocks to rock?

After a stint with Exxon, he headed software and later engineering development for Landmark. He also led the team that developed the OpenWorks database system.

By 1989, the company was doing well and "didn't depend on entrepreneurship any more," he said. He retired from Landmark to study music composition at Rice University.

"I was a 40-year-old student among primarily a bunch of high school kids," he said. "They got me interested in the technical aspects of music, synthesizer algorithms and such."

Solving so-called "impossible" challenges became Antares' mission.

"Look, it costs millions to drill a well and you can't predict the results. Oil companies spend a lot of money to maximize their gamble," he said.

"We bring that maturity in technology development to this industry," he continued. "In seismic, an artifact in the data can be a disaster. The need for quality in that science, I carried over with me."

Hildebrand's Auto-Tune wasn't the first algorithm (for pitch correction), "but it was the first one that worked," he said.

Deconvolution is another "huge" crossover from the oil patch, he said.

First applied to seismology in the 1950s, then to speech in the '60s, the technique allows computer modeling of a speaker's or singer's throat as they vocalize. In a nutshell, it allows the pitch to be changed without making the speaker "sound like a chipmunk."

"This company has taken its understanding of that kind of arithmetic to do a superior job," he said.

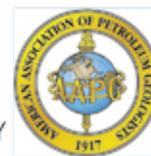
Hildebrand estimates 90 percent of current radio playlists involve his products.

In some ways, the science that located the fuel that's in your car also put the songs on its radio.

That comes as no surprise if you've ever visited the Antares website, which outlines the company's mission as "world domination." ■



5-7 March 2013
Business Design Centre,
London



ORGANISED BY

The INTERNATIONAL A&D forum to buy, sell and promote worldwide E&P deals

Whether you're looking to buy or sell deals, expand into new areas, find new strategic partners, or just stay on top of the industry, APPEX is the place to be.

- Your one-stop shop for global upstream opportunities.
- Connect with buyers, properties and prospects from around the globe – find the next deal first.
- Explore a programme of regional and topical speakers to keep you on top of worldwide trends and discoveries, including finance forum, prospect forums, and the international pavilion.
- Discover thousands of exploration products and services from around the world.
- Meet, discuss and negotiate deals with global decision makers.

Apex brings together principals, senior managers, business developers and new venture managers for an unmatched opportunity to network and do business with NOCs, governments, financiers and global E&P deal-makers and decision-makers.

Register before the 11th
January and save £200.00

"We needed to get the senior decision makers from the biggest companies in the business to view our farmout opportunities; we met them at APPEX."

Graham Heard, Exploration & Technical Director, Northern Petroleum Plc

"We received a number of important visitors to our booth and made good contacts. The right place to be for introducing license rounds."

Thorarinn Arnarson,
National Energy Authority of Iceland

"As a financier of oil and gas, APPEX allows me to keep updated on the current 'hot' exploration plays and to initiate contacts with the people who may discover the next Mahogany."

Sebastien Renaud, BNP Paribas, France

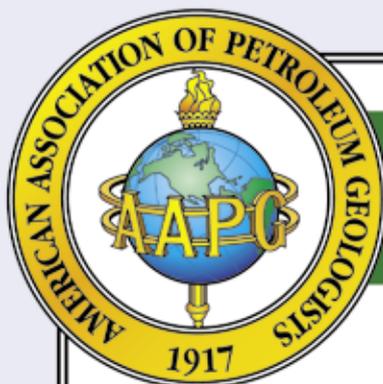
ENDORSED BY



PARTNER



www.apexlondon.com



10th ANNUAL
WINTER EDUCATION CONFERENCE

HOUSTON, TX • FEBRUARY 11-15, 2013

Five Great Days of the Finest Geoscience Training for One Low Price

List of Topics:

- Risk and Uncertainty for Contemporary Prospect Evaluation
- Asset Management in Unconventional Plays
- Geocellular Modeling in Unconventional Resources
- Carbonate Reservoir Geology
- Carbonate Seismic Sequence Stratigraphy
- Carbonate Depositional Systems
- Quick Guide to Carbonate Well Log Analysis
- Geological Interpretation of Seismic Data
- Seismic Amplitude Interpretation
- Interpretation of 3D Seismic Data
- Principles and Applications of Well Logging
- Formation Evaluation of Thinly-bedded Reservoirs
- "Old" (Pre-1958) Electric Logs: A Quick Review
- Data Acquisition Methods and Completion Techniques

(Four concurrent sessions each day – mix and match according to your interests and training needs. Buffet lunch and refreshments included each day.)

Small AAPG Bookstore open during breaks each day

Tuition for the week:	Price through 1/14/2013	Price increase after 1/14/2013
AAPG Members.....	\$1795	\$1995
Non Members.....	\$2095	\$2295
Individual Courses	\$500/day	\$550/day

(Your five-day badge can be transferred to a friend or colleague if you can't attend all five days.)

**Hosted by the
 Norris Conference Center:**

803 Town & Country Lane
 Houston, TX 77024
 Phone: 713-590-0950
 Fax: 713-590-0961

Special group rate at nearby
 Hotel Sorella

**Registration and
 information:**

Toll-free (U.S. and Canada)
 888-338-3387, or 918-560-2650
 Fax: 918-560-2678
 E-mail: educate@aapg.org
 Download a registration form at:
www.aapg.org/education/wec.cfm

SIGN UP NOW!

SAVE \$500 BY BECOMING AN AAPG MEMBER
 AND REGISTERING BEFORE JAN. 14th



EXCELLENCE THAT RUNS DEEP

Subsurface Consultants & Associates, LLC
www.scacompanies.com

UPSTREAM CONSULTANCY SERVICES

UPSTREAM TRAINING SERVICES

PROVEN SCIENCE, PROVEN RESULTS

SCA has geoscience openings for the following:

- > Prospect Evaluation
- > GOM - Lease Sale Support
- > Exploration/Development - Permian Basin

APPLY NOW!
 Scan QR code
 for SCA's
 complete
 job listings.



SES Unlimits Your Seismic Potential Worldwide:

- Cutting edge seismic equipment leasing pool
- Unsurpassed technical support and training
- Extensive inventory of parts on demand
- Just-in-time delivery 24/7

SES is an OEM Certified Service and Repair Facility.

Tel: +1.281.313.9494 - Fax: +1.281.313.9499
www.globaleses.com



Abstracts due Nov. 15

URTeC Deadline Looms

The call for papers deadline arrives this month for the inaugural Unconventional Resources Technology Conference (URTeC), a joint venture that will bring together for the first time the key disciplines and technologies engaged in the development of North American unconventional resource plays. The paper deadline is Nov. 15.

URTeC, sponsored by AAPG, the Society of Petroleum Engineers and the Society of Exploration Geophysicists, will be held Aug. 12-14 in Denver.

Organizers are seeking papers from petroleum engineers, geologists, geophysicists and other professionals interested in sharing innovations, best practices and experiences in integrated approaches for North American unconventional resource plays.

The event is intended to fill the need for a peer-reviewed, science-based conference that will take an asset team approach to development of unconventional resource plays.

The program includes 20 themes applicable to unconventional resources and appeals to engineers, geologists and geophysicists, including:

- ▶ Unconventional Project Development.
- ▶ Unconventional Reservoir Characterization.
- ▶ Unconventional Shale Plays.
- ▶ Unconventional Tight Oil and Tight Gas.
- ▶ Unconventional Coal Seam/

Bed Methane.

- ▶ Other Unconventional Reservoirs.
- ▶ Formation Evaluation of Unconventional Reservoirs.
- ▶ Fracture Characterization.
- ▶ Lateral Well Characterization.
- ▶ Flow Mechanics in Tight Reservoirs.
- ▶ Laboratory Methodologies.
- ▶ Reservoir Monitoring.
- ▶ Organic Geochemistry.
- ▶ Well Performance Prediction.
- ▶ Fluid Behaviors.
- ▶ Drilling Optimization.
- ▶ Completion Optimization.
- ▶ Geomechanics.
- ▶ Three-D Seismic Applications.
- ▶ Health, Safety and Environmental Issues.

The three technical program co-chairs are AAPG Honorary Member and past president Steve Sonnenberg, with the Colorado School of Mines; AAPG member Ken Beeney, with Devon Energy; and Luis Baez, with BG Group.

"The combined power of these three leading scientific organizations means URTeC has the potential to be the most substantial inter-society collaboration since the Offshore Technology Conference began in the 1960s," said past AAPG president Paul Weimer.

To submit an abstract, or for more information and/or to request information on exhibiting and sponsoring, visit the URTeC website at www.urtec.org.

And remember: The deadline is Nov. 15. ☐

INFORM – DISCUSS – LEARN – SHARE • THE AAPG GTW EXPERIENCE

AAPG GEOSCIENCES TECHNOLOGY WORKSHOPS

Focused Workshops to Enhance Your Career

INFORM DISCUSS LEARN SHARE: THE AAPG GTW EXPERIENCE



Asia Pacific Deepwater Plays: Exploration and Production

12-14 March 2013 • Brunei Darussalam

14 March : Field Trip (details TBA)

Deepwater plays in Asia-Pacific remain a hot topic as many operators are active with their exploration activities whilst some fields are in the appraisal and development stage. New technologies and geological concepts were brought into the region and applied in a variety of studies and projects.

This workshop facilitates companies and individuals who are involved in Asia-Pacific deepwater plays to share and learn from others. Presenters will bring updates on various deepwater plays in the region and analogs from different regions will be presented in this event as well. There will be several open discussion sessions to involve participants in interactive discussions.

Expected to attend are exploration and development geologists, geophysicists, log analysts, and managers involved in deepwater exploration and production activities. The workshop will benefit everyone from experts to those unfamiliar with deepwater systems.

Supported by



Profits & Pitfalls of Shallow Seismic Anomalies

11-12 June 2013 • Kuala Lumpur, Malaysia

This will be AAPG's first-ever GTW in Malaysia. There have been several recent well-tests of shallow seismic anomalies in Malaysia and in SE Asia – with decidedly mixed results. Speakers will be invited to work through pre and post drill analysis and then focus on lessons learned to design a way forward so that the industry can increase the success-rate from these class of exploration targets.

Many DHI or DrHI (Direct reservoir-HC Indicator) studies, especially in NW Borneo, have been carried out over the years, but if we cannot predict accurately in the shallow sedimentary section - where we have the best signal-to-noise ratio – it decreases confidence at more deeply buried targets. What do new techniques have to offer? (CSEM, multi-azimuth 3D, advances in the use of shear and converted shear waves, better processing algorithms). This is the chance to discuss what has happened and to learn about new tools/techniques that could improve your firm's exploration success. Can this learning be extended to the drilling of wildcats in less-calibrated regions?

This workshop is expected to be of key interest to all explorationists in the SE Asian region. Join this GTW to share your insights and experiences and update your skills with the experiences and insights of others.

Endorsed By PETRONAS & Geological Society of Malaysia



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

Teams, sponsors sought IBA 'Season' Begins

By **DAVE COOK**, AAPG IBA Co-Chair

The AAPG Imperial Barrel Award competition has gone from strength to strength since its inception at the 2007 AAPG Annual Convention and Exhibition (ACE) in Long Beach, Calif., when seven invited teams from the United States, UK and Russia took part.

In 2012, once again at an ACE held in Long Beach, 100 teams from 33 countries competed, and the team from Louisiana State University at Lafayette won first place at the global final.

First and foremost the IBA is an educational program – which in 2012 involved in excess of 500 students worldwide – providing petroleum geoscience training in many universities that ordinarily would not have access to it.

As the IBA Mission Statement says:

"The IBA is an educational program in which graduate geoscience students experience the work of a team of explorationists evaluating geological and geophysical data within a simulated corporate environment."

Furthermore, the program provides students with an insight into the hydrocarbon exploration business and networking opportunities with senior professionals and managers. Many of the IBA participants are now pursuing careers in the industry – and having participated in the IBA is considered to be an important addition to a student's curriculum vitae.

The 2012 competition cost approximately \$750,000 and was supported by many corporate sponsors, the AAPG and the AAPG Foundation.

Students and Faculty Advisers

For those who want to participate in the 2013 IBA, now is the time to organize your teams and familiarize yourselves with the information on the IBA website (aapg.org/iba) – and in particular, the IBA Rules and Operating Procedures.

And mark this key date: The application deadline is Dec. 14.

Some AAPG Regions and Sections, for financial and logistical reasons, might have to limit the number of teams taking part in the competition, so it will be first come first served.

Please be sure that you have the hardware in place to conduct geophysical and geological interpretation and, if necessary, apply for software.

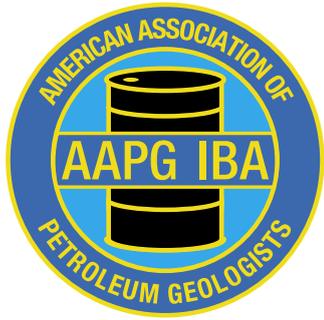
If you have any questions please contact the relevant person listed on the website or your Region/Section IBA coordinator.

Companies

AAPG would be unable to run this important educational program without the financial support of our industry sponsors.

If your company has not previously sponsored the IBA, please seriously consider doing so this year. Visit the website for details of how to sponsor, sponsorship levels and rewards.

Additionally if you have a well and seismic dataset that is suitable for an exploration project – and that you are willing to donate to the program – please contact either Charlotte Hamilton or Dave Cook



through the contacts listed on the website.

Finally, a big thank you to the many companies that have provided financial support, datasets, judges and mentors to the IBA program over the past five years. You have significantly enhanced the educational experience of numerous students – and

opened their eyes to what a career in our industry has to offer. ☒

UCRA Software is here

Rose & Associates

UnConventional Resource Analysis, an affordable, fully probabilistic cash flow model for staged investments in shales and other resource plays that relates risk, land position, fluid type, play and per well resources.

Insights for analysis, decision making and negotiation.

<http://www.roseassoc.com/SoftwareTools/UCRA.html>

AllisonDunn@RoseAssoc.com

713 528 8422

Transferring E & P Risk Assessment Expertise
Instruction • Software Tools • Practical Consultation

APPLIED GEOSCIENCE CONFERENCE

*Applied Geoscience for Mudrocks System
Characterization to Improve Exploitation
of Unconventional Oil and Gas Reservoirs*



February 18 – 19, 2013

**Westin Memorial City
945 Gessner Road
Houston, TX 77024 USA**

Integrated Approaches to Unconventional Reservoir Assessment & Optimization

Presentations will include discussions of unconventional oil and gas reservoirs across North America with major themes in:

- Day 1: Outcrop to Subsurface Characterization
Emerging Plays
- Day 2: Mudrocks System Characterization
Reservoir Characterization Towards Optimized Stimulation and Production

Features invited technical subject matter experts of industry, government & university.

Discussions on well placement, completion strategy, stratigraphy, petrology, geochemistry, geomechanics, field, log and core studies and integration across subject fields.

Houston's premier technical event for geologists, geophysicists, geochemists, nanno experts and engineers.

Be a Corporate Sponsor!

For more information on registration, sponsorship and to view the speaker line-up, please visit www.hgs.org.

Hosted by Houston Geological Society.

Sponsored by  **Weatherford**
LABORATORIES

Riding High, Africa Region Eyes Crucial Event

By CAROL CAIN MCGOWEN

The trend of exploration success in many parts of Africa is almost unprecedented.

As recently as September, Ghana National Petroleum Corporation (GNPC) announced the Sankofa East discovery well offshore Ghana with an initial production test of 5,000 bopd, confirming both non-associated gas and oil potential.

Apart from Ghana, there are the success stories from Sierra Leone, Liberia and Niger on the West African side, while virtually all the countries in East Africa have reported good reserves of oil and gas.

Contrast with Nigeria, with the greatest concentration of AAPG Africa Region members, where industry investment in new deepwater exploration has fallen off in the last few years.

According to Afe Mayowa, president of the Nigerian Association of Petroleum Explorationists, "To further grow the Nigeria reserve base – and indeed, West Africa – it is our belief that governments of these regions must make conscious efforts at encouraging hydrocarbon exploration from the inland basins to ultra-deep plays."

Government regulation and a favorable business environment for oil and gas exploration, production and transport to market are factors of concern worldwide. Businesses, whether in Nigeria, Ghana or virtually any energy producing country, share another concern. That is: Will the current and future work force be sufficient in size and skill level to contribute to global energy needs – or even sufficient to support



MAYOWA

Over the course of the conference students, young professionals and industry leaders will interact during four career-focused events.

the energy demands required for growth of the nation?

To address Nigeria's pressing work force development needs, AAPG Africa Region and affiliate, the Nigerian Association of Petroleum Explorationists (NAPE), are collaborating to offer a comprehensive multi-event program for students and young professionals. The program is part of the 30th annual International Conference and Exhibition, set Nov. 11-15 at Victoria Island, Lagos.

Mayowa said the selection of the conference theme, "Nigeria Oil and Gas Exploration: The Next Frontier," should help evolve strategies to sustain interest in active exploration of the remaining – potentially huge – petroleum resources in both the Niger Delta petroleum province and Frontier Inland Basins.

Over the course of the conference students, young professionals and industry leaders will interact during four career-focused events:

▶ Local-Student Chapter Leadership

Summit (L-SCLS).

AAPG Africa will organize the second-ever L-SCLS offered in the Regions (AAPG's Canada Region in 2011 was the first Region to organize and run a L-SCLS, at the University of Western Ontario).

Femi Esan, who serves as Student Chapter Committee Liaison for Africa Region, attended the Global Student Chapter Leadership Summit (SCLS) during AAPG Leadership Days this year to learn the model for leading the Africa Region L-SCLS. Most importantly, presidents of 15 student chapters in Nigeria were invited to take part in the leadership summit. Corporate sponsorship will cover travel and lodging expenses for the students.

NAPE serves as the sponsor society to all AAPG student chapters in Nigeria through its University Outreach Program.

Piloted by the Student Chapters Committee (SCC) and funded by the AAPG Foundation, the annual AAPG Student Chapter Leadership Summit (SCLS) expanded over the last six years since the program's inception. Most recently, 21

students from around the world attended the event in August prior to AAPG Leadership Days in Tulsa.

The successful leadership summit is now being expanded locally to every Region and Section, hence the name "Local-SCLS."

The global growth of the SCLS is no accident.

"The Student Chapter Committee designed the growth of the Student Chapter Leadership Summit as a way to energize students and encourage active participation in the AAPG," said Chevron's Stephanie Thomas, vice chair over all SCC international operations.

Esan, who was recently elected AAPG Africa Region vice president, said the group is "trying to sync our Student Chapter programs with our Young Professionals (YP) programs as much as possible."

And working hard to coordinate the AAPG-NAPE student and YP programs is a team of volunteers under the leadership of AAPG Distinguished Service Award winner Adedoja "Doja" Ojelabi, Chevron.

▶ **Basin Evaluation Competition.**

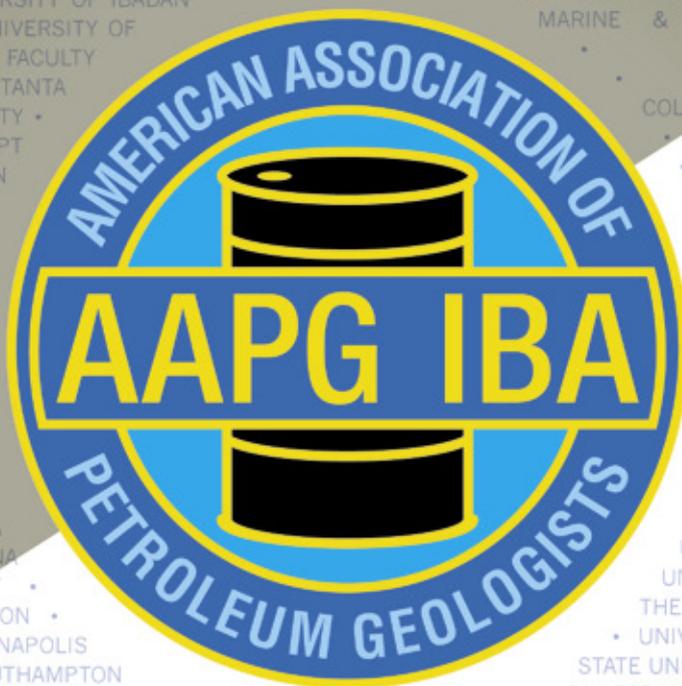
Africa was the first AAPG Region to implement sub-regional IBA competitions. Qualifying competitions in 2012 for universities in North Africa, West Africa and South Africa enabled more schools to experience the IBA program. From the sub-regional qualifying competitions,

Continued on next page

COMPANIES – SUPPORT THE FUTURE SPONSOR THE AAPG IBA PROGRAM

UNIVERSITY OF NIGERIA, NSUKKA • UNIVERSITY OF GHANA • FEDERAL UNIVERSITY OF TECHNOLOGY, AKURE • FEDERAL UNIVERSITY OF TECHNOLOGY, OWERRI • UNIVERSITY OF LAGOS, NIGERIA • UNIVERSITY OF IBADAN • UNIVERSITY OF WESTERN CAPE • ENUGU STATE UNIVERSITY OF SCIENCE & TECHNOLOGY • SUEZ CANAL UNIVERSITY • FACULTY OF SCIENCE ALEXANDRIA UNIVERSITY, EGYPT • TANTA UNIVERSITY • ZAGAZIG UNIVERSITY • HELWAN UNIVERSITY • UNIVERSITY OF CAIRO • AIN SHAMS UNIVERSITY OF EGYPT • INDIAN SCHOOL OF MINES, DHANBAD • KHON KAEN UNIVERSITY • CHINA UNIVERSITY OF PETROLEUM (BEIJING) • BAHRIA UNIVERSITY, KARACHI • UNIVERSITY OF INDONESIA • UNIVERSITAS GADJAH MADA • NATIONAL UNIVERSITY OF MALAYSIA • UNIVERSITY OF SINDH • PEKING UNIVERSITY • INSTITUT TEKNOLOGI BANDUNG (ITB), INDONESIA • UNIVERSITY OF KARACHI, DEPARTMENT OF GEOLOGY • THE UNIVERSITY OF WESTERN ONTARIO • DALHOUSIE UNIVERSITY • UNIVERSITY OF ALBERTA • ACADIA UNIVERSITY • MEMORIAL UNIVERSITY OF NEWFOUNDLAND • MCMASTER UNIVERSITY • UNIVERSITY OF CALGARY • UNIVERSITY OF PITTSBURGH • PENNSYLVANIA STATE UNIVERSITY • UNIVERSITY OF SOUTH CAROLINA • UNIVERSITY OF GEORGIA • INDIANA UNIVERSITY • WEST VIRGINIA • UNIVERSITY OF WISCONSIN, MADISON • INDIANA UNIVERSITY • PURDUE UNIVERSITY INDIANAPOLIS • OCEAN AND EARTH SCIENCE UNIVERSITY OF SOUTHAMPTON • UNIVERSITY OF STAVANGER, NORWAY • UNIVERSITY OF ABERDEEN • NATIONAL TARAS SHEVCHENKO UNIVERSITY OF KYIV • UNIVERSITY OF MONTPELLIER • EOTVOS LORAND UNIVERSITY • TYUMEN STATE OIL AND GAS UNIVERSITY • DELFT UNIVERSITY OF TECHNOLOGY • ROYAL HOLLOWAY, UNIVERSITY OF LONDON • LOMONOSOV MOSCOW UNIVERSITY • IFP SCHOOL • LASALLE BEAUVAIS INSTITUTE • UNIVERSITY OF BUCHAREST • IVANO-FRANKIVSK NATIONAL TECHNICAL UNIVERSITY OF OIL & GAS • INSTITUTE OF PETROLEUM ENGINEERING HERIOT-WATT UNIVERSITY • SCHOOL OF EARTH, ATMOSPHERIC & ENVIRONMENTAL SCIENCES • NANCY

SCHOOL OF GEOLOGY • UNIVERSITY OF MISKOLC • LISBON UNIVERSITY • NORWEGIAN UNIVERSITY OF SCIENCE & TECHNOLOGY • UTRECHT UNIVERSITY • UNIVERSITY OF MANCHESTER • AZERBAIJAN STATE OIL ACADEMY • GUBKIN RUSSIAN STATE UNIVERSITY OF OIL AND GAS • AUBURN UNIVERSITY • RICE UNIVERSITY • TEXAS A&M • UNIVERSITY OF HOUSTON • UNIVERSITY OF NEW ORLEANS • LOUISIANA STATE UNIVERSITY • STEPHEN F. AUSTIN UNIVERSITY OF ALABAMA • UNIVERSITY OF LOUISIANA AT LAFAYETTE • UNIVERSITY OF TEXAS AT AUSTIN • ROSENSTIEL SCHOOL OF MARINE & ATMOSPHERIC SCIENCE UNIVERSITY OF MIAMI • UNIVERSIDAD CENTRAL DE VENEZUELA • UNIVERSIDAD INDUSTRIAL DE SANTANDER COLOMBIA • UNIVERSIDAD DE LOS ANDES • ENGINEERING GEOPHYSICS OF THE USB • UNIVERSIDAD PEDAGOGICA Y TECNOLOGICA DE COLOMBIA • EAFIT UNIVERSITY • NATIONAL UNIVERSITY OF COLOMBIA • COLOMBIA • UNIVERSITY OF STATE OF RIO DE JANEIRO • FACULTAD DE CIENCIAS NATURALES Y MUSEO U.N.L.P. • OKLAHOMA STATE UNIVERSITY • UNIVERSITY OF OKLAHOMA • MISSOURI UNIVERSITY OF SCIENCE AND TECHNOLOGY • UNIVERSITY OF ARKANSAS • KING ABDUL AZIZ UNIVERSITY • THE HASHEMITE UNIVERSITY • FACULTY OF EARTH SCIENCES PETROLEUM GEOLOGY & SEDIMENTOLOGY DEPARTMENT • KING FAHD UNIVERSITY OF PETROLEUM & MINERALS • KUWAIT UNIVERSITY FACULTY OF SCIENCE • KING SAUD UNIVERSITY, FACULTY OF SCIENCE GEOLOGY DEPARTMENT • THE PETROLEUM INSTITUTE • SULTAN QABOOS UNIVERSITY • UNIVERSITY OF CALIFORNIA - SANTA BARBARA • SAN DIEGO STATE UNIVERSITY • CALIFORNIA STATE UNIVERSITY BAKERSFIELD • CALIFORNIA STATE UNIVERSITY, LONG BEACH • UNIVERSITY OF ALASKA FAIRBANKS • BRIGHAM YOUNG UNIVERSITY-IDAHO • COLORADO SCHOOL OF MINES • BOISE STATE UNIVERSITY • UNIVERSITY OF TEXAS AT EL PASO



**TEAMS – BE THE FUTURE
SIGN-UP DEADLINE DECEMBER 14**

Continued from previous page

winning IBA teams went on to represent their universities and countries in the Africa Region finals competition held in Lagos.

These qualifying competitions serve to multiply the number of students and universities that benefit from access to industry, improvement in analytical thinking and presentation skills, and awareness of how the geosciences are integrated and applied on the job.

Similarly, BEC organizers hope to instill participating graduate students with a higher level of industry preparedness.

A call went out to industry for volunteer mentors and judges. The response from local companies, IOCs and service companies was "surprisingly overwhelming," according to AAPG Africa Region President Gilbert Odior, with Esso Exploration & Production Nigeria Ltd.

From over 40 companies that responded, three judges and five mentors per team were selected – mainly young professionals and mid-career geologists.

Mentors followed IBA rules and were permitted to instruct students on how to perform a task, provide advice on presentation content and encourage students to consider alternative ways to approach the tasks required by the program. Under no circumstances, however, were mentors allowed to actually perform the work of the team, understanding that violation of this rule would result in the immediate disqualification of the team from the IBA competition for the year.

According to Ojelabi, who also serves as IBA coordinator for the Africa Region, "our goal is to help level the playing field for schools to compete in the 2013 IBA event."

(Likewise, for the past two years IBA coordinators for the AAPG Gulf Coast Section offer a basin analysis training course taught by ExxonMobil for students annually at the GCAGS conference.

Teams from six Nigerian universities will each give 20-minute presentations of their basin evaluation interpretations to the panel of industry judges. After the student presentations and before the judging results are announced, a Shell Nigeria geoscientist will provide a "prospect generation overview."

The overview, from discovering the opportunity through field development, is designed to not only impart up-to-date industry knowledge about prospect generation but also to impress upon the students the significance of the work they have just presented and the career opportunity that awaits them.

► **YP Cocktail/Networking.**

Talent hunting and awareness of company training programs top the list of objectives for the YP cocktail event.

Organizers are targeting about 100 participants and hope to gain commitment from new industry young professionals and grad students to take part in future AAPG-NAPE YP initiatives.

Masters-level students who took part in the Basin Evaluation Competition also are invited.

Starting with a Meet-n-Greet activity, the event's program will highlight the latest AAPG-NAPE YP initiatives, ranging from educational support programs to networking.

"This event is designed to involve the industry on the wave of the YP program, such that they can also be committed to this cause," said Tunbosun Oke, with Shell and also the AAPG YP lead.

Featured speaker, David Curtiss, AAPG executive director, will share an overview of AAPG's global commitment to students and young professionals.

► **Mentoring Sessions.**

The idea for mentoring sessions originated with NAPE; career advice sessions are offered each year during the NAPE annual conventions, as industry executives provide wisdom gained from their successful careers during designated times in the exhibition hall.

This year, platforms for giving mentoring advice will be shared by both NAPE and AAPG executives.

Attracting students to our organization and retaining them as young professionals during their early career years is paramount to the future of AAPG.

"Our message to students is that AAPG belongs to them as much as it belongs to professionals," said Stephanie Thomas. "The greater the student participation, the more likely the AAPG will retain members as students transition to professionals." ■

Play – Based Exploration

Rose & Associates

Consultation
Proper techniques for consistent assessment and valuation
Independent assessments available

Training
Industry-unique course addressing all aspects of quantitative
common risk segment mapping & analysis of play-specific data

Software
flexible, elegant solution to manage the process of common
risk segment maps for play and prospect-specific chance

http://www.roseassoc.com/RA_PBE.html

AllisonDunn@RoseAssoc.com
713 528 8422

Transferring E & P Risk Assessment Expertise
Instruction • Software Tools • Practical Consultation

LOOKING FOR MORE OTC SUCCESS?



AN OTC EVENT™

JUST ADD ICE!

3-5 December 2012 • George R. Brown Convention Center
HOUSTON

Register now for Arctic Technology Conference 2012.
ATC is the can't miss event from OTC with support from a
dozen of the industry's leading scientific associations.

1300 people from 23 countries attended the
inaugural ATC – make plans to join us this year!

At ATC you'll hear from the leaders developing solutions for Arctic exploration & production.
Where else will you find the answers you need for producing results in this challenging
frontier?

- Explore technologies that yield results
- Find products to work in sub-zero temperatures
- Improve your decision making skills

From pipelines to flow assurance, environmental regulations to vessels – you'll see it or
hear it at ATC.

GET REGISTERED TODAY!

www.ArcticTechnologyConference.org



2012 SPONSORS








2012 MEDIA SPONSORS








SPONSORING ORGANIZATIONS










Daniel C. Huston
Holly Hunter Huston

Serving the industry since 1996!



HUNTER 3-D

3-D Seismic Interpretation, 3-D Gravity/Magnetics
Geostatistics, AVO Analysis, Inversion.

6001 Savoy, Suite 110, Houston, TX 77036

(713) 981-4650

e-mail: hunter3d@wt.net

Website: www.hunter3dinc.com

PROTRACKS

YP 'Meets' Prove Effective

By MEREDITH FABER

AAPG's Young Professional Meet-n-Greet and the Young Professional Network Challenge events continue to prove themselves to be powerful networking forums for individuals from a wide variety of backgrounds and in all stages of their careers.

Since their inception at the Annual Convention and Exhibition in 2009, these two events have become a staple of nearly every major AAPG meeting, including the most recent Rocky Mountain Section (RMS) meeting in Grand Junction, Colo., and the International Conference and Exhibition (ICE) in Singapore.

Debut at RMS

The first annual Meet-n-Greet at the RMS meeting in mid-September opened with a flurry of business card swapping and story exchanging as students, young professionals and mentors met to expand their network connections.

In fact, the RMS Committee worked diligently throughout the three-and-a-half day event to include YPs in the meeting program, including:

- ▶ Reserving space for YPs at each meeting function.
- ▶ Introducing them to members of their own professional networks.
- ▶ Providing a space to advertise upcoming YP activities – including happy hours and monthly "Dine and Discuss" events.
- ▶ At Dinosaur Journey, the YPs enjoyed dinner and toured the museum.
- ▶ On the final night, the RMS YPs hosted a screening of Scott Tinker's film "Switch" at the Avalon Theater. The festivities concluded with a drawing for two copies of the Colorado Geological Survey's book, "Written in Stone" (graciously donated by Weatherford).

Around the World

At the AAPG ICE Meet-n-Greet the following week in Singapore, nearly 125 students and young professionals from Indonesia, Malaysia, Singapore, India, Pakistan, Australia and Thailand were paired with about 30 mentors from around the world.

The event encouraged students and early-career geoscientists to network with seasoned industry professionals – many of whom have participated in previous Meet-n-Greet events.

Among the mentors were past and current Executive Committee members, both AAPG president-elect candidates, Region officers, committee chairs and members and AAPG Executive Director David Curtiss.

The discussions on careers, personal development, experiences in industry and future meetings and workshops continued during the YP Network Challenge. This event challenged 25 participants to build their professional networks by interacting with AAPG's members and exhibitors. More than 28 dedicated mentors and volunteers and 30 exhibitors facilitated this opportunity, offering guidance and expertise to the many young geoscientists in attendance.

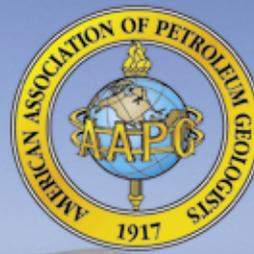
Three cash prizes (donated by AAPG) and two fossils (donated by Herman Darman) were awarded to Network Challenge participants via a random drawing at the Student Reception. Anindya Satya Putri, Syukron Ady Purnawiranto and Muhammad Ahmed Raza received \$200, \$100 and \$50, respectively, while the fossils specimens were presented to Kinanti Hapsari and Bellinda Nur Citalady.

On behalf of the YP Committee, thank you to everyone who made these events possible. The Meet-n-Greets and Network Challenges are essential – not only to facilitating discussion across many levels of the AAPG global organization, but also for sustaining the interest of students and young professionals in AAPG activities.

The continued success of Meet-n-Greet and Network Challenge events provides solid evidence of the importance of cultivating relationships with young geoscientists who will become the future leaders of AAPG. 

AAPG European Regional Conference Exploring the Mediterranean: New Concepts in an Ancient Seaway

8-10 April 2013 | Princesa Sofia, Barcelona



www.aapg.org/barcelona2013

Registration Open

A rich human history of civilisation, trade and war is deeply rooted in the complex ancient geology that underlies the Mediterranean region, having evolved through the convergence of the European and African plates and the closure of the Tethys Ocean. In more recent times, oil and gas exploration has found success in the diversity of resulting extensional and compressional tectonic regimes, with a procession of new plays being identified over decades of industry and academic activity. Despite intensive exploration, the region continues to deliver tangible success through its rich diversity of play types, as recent discoveries in the Eastern Mediterranean have testified.

Themes will include:

- Geotectonic evolution of the Mediterranean.
- The impact of the Messinian Salinity event in exploration.
- Carbonate plays in the Mediterranean.
- Petroleum systems and source rocks.
- New exploration in the Eastern Mediterranean.
- The Nile Delta revisited.
- Recent exploration along the North African coast.
- The Western Mediterranean and the Alboran Sea in focus.
- Prospectivity and new plays in the Adriatic Basin.

This significant conference will assemble some of the best current thinking in Mediterranean petroleum geology, from the tectonics that underpin the basin, to the Messinian salinity event and its impact on exploration. From North Africa to the Adriatic, this conference will bring together the multiple cultures that surround this diverse region to reflect on a common geological framework and the petroleum systems that transcend political boundaries. With its position to the west of 2.5 million sq. km of water, Barcelona will form the ideal backdrop to this timely event.

**Register before
the 24th
December and save
up to € 100.00**

Interested in **sponsoring** this event? Visit the website for full details of our sponsorship packages or contact Fionn Devine at fdevine@AAPG.org. We can customize sponsorship opportunities to match your marketing plan.

FOUNDATION UPDATE

Contributions rise

It Was a Very Good Year

By NATALIE ADAMS, AAPG Foundation Manager

This has been a very good year for contributions to the AAPG Foundation.

To date, contributions received by the AAPG Foundation have surpassed 2011 gifts by nearly \$400,000 – donors responded overwhelmingly to the 45th anniversary mailing from Foundation Chairman Bill Fisher asking for a renewed interest in the Foundation.

Funds that top the list for largest donations this month are the Visiting Geoscientists Fund, the General Fund, the Distinguished Lecture Fund, the Education Fund and various Named

Grant-in-Aid funds.

Gifts to the Foundation enable continued support of many fantastic endeavors, and your support is so appreciated.

* * *

The AAPG Foundation Trustee Associates welcomes another new member: **Priscilla Grew**, of Lincoln, Neb.

Grew, a former director of the California Department of Conservation and of the Minnesota Geological Survey, is director of the University of Nebraska State Museum. 

Foundation (General Fund)

James Kerr Anderson
Cecil O. Basenberg
John Howard Bauch
Henry Bercutt
James Earl Bruning
In memory of John T. Wilband
Wallace Edward Brunson
L. Taras Bryndzia
Jeffrey C. Bulsa
Don Forrest Carlos
In memory of Evard P. Ellison
Marvin Paul Carlson
John Arthur Carver
Chevron Humankind
Matching gifts/ Donald Medwedeff and Richard Ball
Mark P. Cloos
M.A. Custer
Corrected Fund
Donald William Davis
Ross Elmo Dawson Jr.
Paul H. Dudley Jr.
In memory of A. Sid Bonner
Lynn E. Duncan
Robert Fleenor
Leonard Samuel Fowler
James Howard Frasher
Leon Horace Gerlich
Gary Michael Harbin
Thomas Bertram Hoane
Orman John Hubbard Jr.
Curtis Carlyle Humphris Jr.
Crandall Davis Jones
Douglas William Jordan
In memory of Wayne A. Pryor
Patrick F. Kelly
William C. Kimbrell
Jonathan L. Konkler
Carl William Kuhnert Jr.
Hermann D. Lebit
Robert William Luker
Robert Michael Mason
In memory of Jim Clement and Lee Garrett
James Clifton Musgrove
Joe A. Nahama
Mark Allan Patterson
Daniel B. Pearson III
In memory of William Josiah Taylor Jr.
Robin Ann Pearson
Carlos Pirmez

Arthur Frank Preston
Gary Raker
Edward Lewis Reid
John William Robinson
John William Ruwwe Jr.
Jack Steele Sanders
Bill St. John
Stanley Black & Decker Inc.
Matching gift/Deborah Patterson
Howard Allen Sykes
Chad Eric Taylor
David Andrew Taylor
Brian R. Tufts
Herman L. Vacca
Steven James Wade
Janine F. Weber
B. Ray Willis
Ralph Owen Wilson II
Herbert Arthur Young

Digital Products Fund
University of Kentucky

Jonathan L. Konkler
University of Wisconsin
Randal L. Billingsley
University of Wyoming
David Andrew Taylor

Distinguished Lecture Fund

Robbie Rice Gries
In memory of Bill Muehlberger
Shane Edwards Matson
In memory of Thomas E. Matson and George C. Matson

Education Fund

Barth Wetmore Bracken
Philip Braithwaite
William Plack Carr
Chih Shan Chen
Jack Hilbert Christiansen
Howard Ross Cramer
M.A. Custer
Douglas Burton Dunn
Thomas McCloskey Helm
John W. Hjerpe
In memory of Bob Nance
John C. Horne
Curtis L. Johnson
John Christian Kraft

William Emmett Shafer
Joe Rolfe White Jr.

Enhancing the Quality Of Earth Science

Shell Exploration and Production
Colorado School of Mines
Joe A. Nahama

Grants-in-Aid Fund

Robert Lee Cash
In memory of Dorothy M. Cash
M.A. Custer
Stephen J. Gillotti

Donald A. and Mary O'Nesky Named Grant

Don and Mary O'Nesky
In memory of Sherry Davis

Herbert G. and Shirley A. Davis Named Grant

Herbert G. Davis
In memory of Michael S. Shearn

Ohio Geological Society Named Grant

Lawrence H. Wickstrom

Sherman A. Wengert Memorial Grant

Henry Irwin Snider

James A. Harman Student Chapter Leadership Summit Fund

Rhonda A. Welch

Boone Pickens Digital Geology Fund

David Andrew Taylor

E.F. Reid Scouting Fund

John Arthur Carver
In memory of Bud Reid
Paul H. Dudley Jr.
In memory of William E. Carl

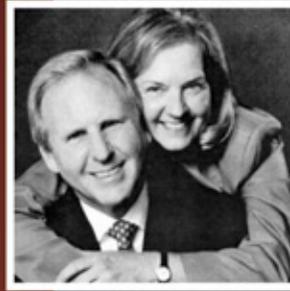
University Research

Ilissa Sternlicht
In memory of Robert W. Richter

Visiting Geoscientist Fund

Tako Koning

WHY I DONATE TO THE AAPG FOUNDATION:



I am grateful for the professional and technical platform that AAPG has provided. The Foundation helps to advance and promote geoscience applications to meet our growing energy needs – something we can all support.

-Chuck Williamson

Petroleum geoscience has been good for society and good for me. AAPG is the leading guardian of the science, and the AAPG Foundation is key to the healthy future of global petroleum geoscience and geoscientists and the wonderful contributions they make to global prosperity.



-Pete Rose

I have supported our AAPG Foundation for 30 consecutive years. Good habits are hard to break.

-Tom Fitzgerald

I have been a petroleum geologist for more than 60 years and AAPG has been the primary organization in my career. I wish to see this professional and scientific organization expand and continue into the distant future. I donate to the Foundation in memory of past AAPG officers with whom I have served and in honor of my hundreds of petroleum geology students who have had distinguished careers in the petroleum industry throughout the world.

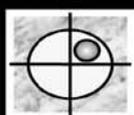
-John D. Haun

It seems like a way to give back a bit of what I have received from my relationship with AAPG.

-Ken Masters



To give to the AAPG Foundation, go online to <http://foundation.aapg.org/donate.cfm> or mail to P.O. Box 979, Tulsa, OK 74101. Questions? Call 1-888-945-2274 Ext. 2644.

IRAQ

In Preparation for the 5th Bid Round
Exploration, Fields Development & Operation Challenges
The 4th Iraqi Petroleum Conference (IPC 2012)
13 & 14 September 2012 @ The Imperial College, London, UK

Missed it! Get your CD from

www.TargetExploration.com/conft.pdf

Contact: M_Casey@TargetExploration.com Tel. (+44) 2073712240/Fax. 2073714120
CDs of IPC 1999 to 2010 and MENA 2000 to 2011 Oil & Gas Conferences are also available

Geology 'Chef' Serves Up a Tasty Idea

By BARRY FRIEDMAN, EXPLORER Correspondent

A man in the kitchen is wearing a chef's hat, a KISS THE GEOLOGIST apron and holding a butane torch and a marshmallow.

Stay with us.

Some look at geology and see history; others see desert.

"Describing layers of rock," says Todd Kent, co-creator of "Geology Kitchen," a new educational earth science web series, "brings about imagery of layer cake, and so we got the idea to add segments that were shot in the kitchen."

The other part of the "we" is AAPG member Devin Dennie, his filmmaking partner, and, together, they decided to construct an instructional video online – brief, fast-paced episodes – where food items and their preparation are used to introduce the wonders of earth science to a 4th and 6th grade audience.

Dennie, a petroleum geologist with Devon Energy, does most of the research and is the on-camera host for the films. Kent, a professional filmmaker, said he is "the production guy."

Together the two formed their non-profit (and now award-winning) production company, Explorer Multimedia Inc., in 2003.

It is a "frugal organization," Kent said, with the two friends doing most of the work themselves in their spare time.

Past productions for the two include "Oklahoma Rocks" and "RockHounds: The Movie" – works that were intended to make geology a bit more accessible and interesting to the general public.

The hurdle they faced with their new



Photos courtesy of Explorer Multimedia

AAPG member Devin Dennie, a petroleum geologist with Devon Energy, has a second life introducing video geoscience "feasts" to the public as co-creator of "Geology Kitchen."

food-themed production was not just the what, but the how.

"The Geology Kitchen format is specifically tailored to the methods of online media consumption," Kent said of the AAPG-sponsored endeavor – meaning these episodes can be downloaded from iTunes and be shared on social media sites, like Facebook.

"Young people live, work and recreate online," he continued, "and to target that audience you need to understand how they receive and process information."

Not just how much they take in, as it turns out, but how much room is left for other information, which explains why he and Dennie keep these videos between

four and six minutes in length.

It's not, Kent believes, that the attention spans of this age group are smaller; it's that the amount of information vying for that attention is so much greater.

"With so many choices on what to see, read, watch or play, kids tend to have smaller increments of time in which they choose to invest their attention."

Kent and Dennie's primary goal, then, was to introduce concepts to pique kids' interest (or appetite, if you will) and/or to supplement teachers' curriculum.

"A fifteen minute video may be interesting," he said, "but, believe it or not, it may be too much of a time investment for kids."

An Appetizing Analogy

The videos are produced and will be distributed by their own Explorer Multimedia.

"One of the benefits of having an online project is the interactivity," Kent said, "and that can be accomplished through the utilization of social media platforms. By maintaining a presence on sites like Twitter, YouTube and Facebook we can have contact with our viewers and the response has been very positive."

It seems to be working.

"We've received, emails, tweets and comments from both students and teachers who are enjoying the show and requesting specific topics for us to cover," Kent said.

And here is where it gets fun: It's geology and science with more peanut butter, grapes and marshmallows than graphs, charts and lectures.

"There is a great episode where we rented an industrial cotton candy machine and made cotton candy as an analogy for various types of mineral formation."

Another episode, which Kent says is their most popular, is titled "Three Types of Rocks," where everything from ice cream, Rice Krispies treats and S'mores were used to demonstrate the formation of igneous, sedimentary and metamorphic rocks.

The purpose of all this is not merely to recreate the scene in "Close Encounters of Third Kind," where Richard Dreyfuss sculpts his pile of mashed potatoes into a reasonable facsimile of Devils Tower – it is to use the processes of cooking, of the food

Continued on next page

AAPG GEOSCIENCES TECHNOLOGY WORKSHOP Focused Workshops to Enhance Your Career



Shale Plays: An Integrated Approach for Enhanced Exploration, Development and Valuation

12-14 November 2012 • Houston, TX

We've entered a new phase of shale plays, and it's more important than ever to have a deep understanding of shale reservoirs and reserves. In order to maximize potential returns, an integrated approach to shale plays is important. Geologists, engineers, geophysicists, petrophysicists, and geochemists need to talk to each other and this GTW is a great opportunity for learning the latest on shale plays and to discuss new directions and strategic approaches.

Fourth Annual AAPG Deepwater Reservoirs Geosciences Technology Workshop

15-16 January 2013 • Houston, TX

Determining reservoir connectivity, calculating pore pressure, understanding the structural subtleties, identifying hazards, and developing accurate images (including subsalt), are deeply affected by new multi-disciplinary discoveries in science and technology. The 4th Annual AAPG Deepwater Reservoirs Geosciences Technology Workshop will return to its roots, and bring together the latest developments.

Solving Water Problems in Oil and Gas Production: New Technologies for Cost Savings and New Revenue Flows

26-27 February 2013 • Fort Worth, TX

Water concerns are intensifying as issues around hydraulic fracturing, new regulations, drought, and surface water management continue to dominate the public. Join us for presentations, intensive discussions, and a review of new and emerging technologies that address current and anticipated problems.

Eagle Ford Shale

18-20 March 2013 • San Antonio, TX

The Eagle Ford Shale is one of the "Big Four" shale plays in the U.S., and the fact it contains both liquids and gas makes it economically viable when other plays are not. Join us as we look at the latest lessons learned and bring together presentations from geology, geophysics, geochemistry, and engineering perspectives to gain insight into productivity in the Eagle Ford.

"Excellent workshops. I appreciate the interdisciplinary nature."

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

PROFESSIONAL news BRIEFS

Tony L. Albrecht, to senior geologist, Hawkwood Energy Management, Greenwood Village, Colo. Previously geologist, Forest Oil, Denver.

Mark S. Caldwell, to exploration manager, Rock Creek Resources, Denver. Previously consulting geologist, Klabzuba Oil & Gas, Denver.

Edward C. Cazier, to senior development geologist-West Africa, Cobalt International Energy, Houston. Previously lead geologist, Maersk Oil, Copenhagen, Denmark.

Gordon Forbes, to principal biopstratigrapher, Shell Exploration and Production, Houston. Previously head stratigraphy, Petroleum Development Oman, Muscat, Oman.

Robert "Bob" Foster, to chief geologist, EXCO Resources, Dallas. Previously geological supervisor, EXCO Resources, Dallas.

Frank W. Harrison Jr. has been awarded Honorary Membership by the Society of Independent Earth Scientists (SIPES) for his longtime service to the organization. Harrison is a past AAPG president and is president of Optimistic Energy, Lafayette, La.

Edward LaFehr, to president, TAQA North America, Calgary, Canada. Previously senior vice president, Talisman Energy, Calgary, Canada.

Ramses Meza, to senior geophysicist-quantitative interpretation, BHP Billiton, Houston. Previously senior geophysicist, ConocoPhillips, Houston.

Stewart G. Squires, to senior reservoir geophysicist, Tricon Geophysics, Denver. Previously geophysicist, FIML Natural Resources, Denver.

John D. Thaeler, to chief operating officer, Vitruvian Exploration II, The Woodlands, Texas. Previously senior vice president exploration, Southwestern Energy, Houston.

A Multi-Client Report Offering:

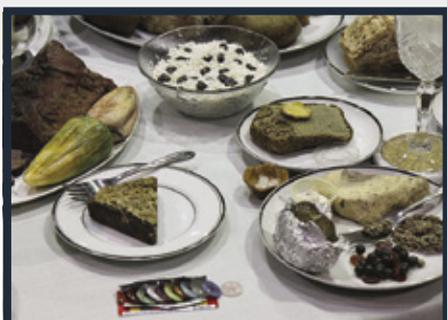
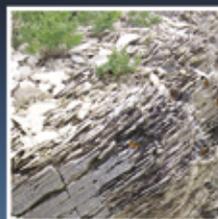
MEXICO AND THE SOUTHERN RIM OF THE GULF OF MEXICO: GEOLOGICAL FRAMEWORK, BASINS, AND PETROLEUM SYSTEMS

This 12 volume literature-synthesis report includes:

- Structural, stratigraphic, and sedimentary basin framework
 - A new plate tectonic reconstruction of Mexico and the Gulf of Mexico
 - Integration of source rocks and reservoirs within the geological framework
 - Petroleum developments and a catalog of 625 fields and 1400 exploration wells
 - Annotated bibliography and keyword cross indices of 5300 references
 - 74 map plates of regional geology, databases, paleogeography, and tectonics
- Report provided as paper+DVD or DVD-only; GIS database add-on also available

Blair & Associates LLC Boulder CO (303) 499-6005 tcblair@aol.com

This Changes Everything.



Look good? It should. All of these "food" samples are rocks, in the Geology Kitchen.

Continued from previous page

itself, to introduce scientific concepts to children.

"Education and outreach," he says, "are tricky things to accomplish – and earth science in particular carries a stigma. Too many people see it as a dry and boring topic."

The Delightful Aftertaste

The key – and the challenge – is making these scientific concepts relatable to an audience in a format they enjoy.

To do that, though, required some help, which is where AAPG came in.

"Over the years we've collaborated with the AAPG on a few projects and were aware of their commitment to education and outreach so we were hopeful that they would support this project."

He said he hoped the fun and uniqueness of Geology Kitchen would appeal to the organization.

It did.

AAPG Foundation program coordinator Jane Terry said of the project, both specifically and generally, "Social media allows worldwide viewers to learn about a topic in a short video format."

And even though the videos, which can easily be downloaded and used on a number of platforms, are only an introduction, Kent says the geology cooked up in the kitchen can produce amazing results.

"An understanding of earth science," he said, "leads to a better understanding of the energy industry." □

UNCONVENTIONAL
RESOURCES TECHNOLOGY CONFERENCE
FUELED BY SPE • AAPG • SEG

12-14 August 2013 • Colorado Convention Center • Denver

www.URTeC.org

Be a part of the integrated event for unconventional resources

CALL FOR PAPERS DEADLINE: 15 NOVEMBER 2012

Announcing the Call for Papers for the Unconventional Resources Technology Conference (URTeC), 12-14 August 2013 at the Colorado Convention Center in Denver. Brought to you by three of the world's leading scientific associations dedicated to the oil and gas industry – SPE (Society of Petroleum Engineers), AAPG (American Association of Petroleum Geologists) and SEG (Society of Exploration Geophysicists) – this event is designed to reach all E&P professionals involved in unconventional resources. Submit your paper on one of these themes by 15 November 2012.



URTeC was developed based on input from oil company professionals who expressed the importance of geologists, geophysicists, engineers and business managers working together to help asset teams hit the sweet spot.

- Theme 1: Unconventional Project Development
- Theme 2: Unconventional Reservoir Characterization
- Theme 3: Unconventional Shale Plays
- Theme 4: Unconventional Tight Oil and Tight Gas
- Theme 5: Unconventional Coal Seam/Bed Methane
- Theme 6: Other Unconventional Reservoirs
- Theme 7: Formation Evaluation of Unconventional Reservoirs
- Theme 8: Fracture Characterization
- Theme 9: Lateral Well Characterization
- Theme 10: Flow Mechanics in Tight Reservoirs
- Theme 11: Laboratory Methodologies
- Theme 12: Reservoir Monitoring
- Theme 13: Organic Geochemistry
- Theme 14: Well Performance Prediction
- Theme 15: Fluid Behaviors
- Theme 16: Drilling Optimization
- Theme 17: Completion Optimization
- Theme 18: Rock Mechanics
- Theme 19: 3-D Seismic Applications
- Theme 20: Health, Safety and Environmental Issues

Commentary

Taking the 'Message' to the Public

By JACK SWICKARD

It started innocently enough with a simple question from past AAPG president Eddie David at the AAPG Annual Convention and Exhibition in Long Beach: Would Rusty Riese come to Roswell to deliver his Distinguished Ethics Lecture on "Oil Spills, Ethics and Society ..." to the Roswell Geological Society?

A simple enough request, but Riese then asked that a public, non-technical audience also be arranged, pointing out that we need to get our messages out to a broader audience.

"We can't keep talking to the choir about the issues that confront our society and to which energy is central," Riese said.

"If I'm coming that far, then use me as much as you can," Riese continued. "I can give you three days on the ground."

That offer set off a flurry of activity that Riese never envisioned.

David started by engaging the New Mexico Landmen's Association and the Desk and Derrick Club of Roswell for the multi-pronged effort he had in mind: a project to engage the entire energy industry in an effort to educate the entire Pecos Valley community.

Together, the three groups then lined-up the Roswell Convention Center for an evening dinner and presentation.

And then, David thought, let's use this as an opportunity to raise scholarship funds for Pecos Valley students going to college in energy-related fields.

At that point a committee of 13 was



AAPG Distinguished Ethics Lecturer W.C. "Rusty" Riese speaks to some 500 people at the Pecos Valley Energy Dinner in Roswell, N.M., the night of Oct. 3.

organized, and all the functions necessary for a convention-scale event were identified. Assignments were given and off they went to line up sponsors, audiences and all the other necessary logistical pieces.

The Roswell school district signed on to the idea of an educational event for their high school and middle school students right away. So did the school districts in Dexter, Hagerman and Lake Arthur. The local parochial and private schools also wanted to have an opportunity to participate, as did the Roswell campus of

Eastern New Mexico University. And the Artesia Chamber of Commerce wanted something done in their community too.

But how could all the students get to the venues? Not a problem said the committee: we'll pay to bus them.

And how could the word be gotten out to the community? That wasn't a problem for this committee, either. They arranged for three radio and newspaper interviews with Riese in the week leading up to his trip so

Continued on next page

The committee that organized the Pecos Valley Energy Dinner and my talks in Roswell, Artesia and Hagerman, N.M., included several members of the AAPG.

Edward K. "Eddie" David, a past AAPG president, was instrumental in lining up sponsors, who were honored at the Oct. 3 dinner at the Roswell Civic Center. Some 500 people – including students, educators and members of the public, as well as people in the energy industry – attended the dinner.

Hosts for the dinner were the Roswell Geological Society, the New Mexico Landmen's Association, and the Desk and Derrick Club of Roswell. Each organization will use proceeds from dinner sponsorships for scholarships.

The first day, I spoke to 825 high school and middle school students in Roswell, starting at 8:30 a.m. Two hours later, I spoke to another 479 Roswell high school and middle school students.

I then spoke to 135 students from Roswell's four Christian schools.

The next morning I spoke to 149 students at Eastern New Mexico University-Roswell. That afternoon I gave presentations to 225 students from the nearby communities of Hagerman, Dexter and Lake Arthur.

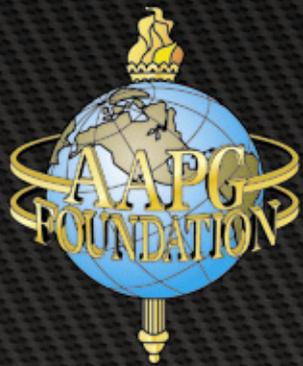
At the New Mexico Military Institute in Roswell some 660 people, most of them cadets, attended the presentation.

The following morning, I gave a presentation to 100 students, educators and members of the public in Artesia, 40 miles south of Roswell.

In all, the committee calculated I addressed 3,073 people during my three days in the Pecos Valley.

– RUSTY RIESE

A A P G F O U N D A T I O N



For more information,
or to make a contribution,
go online to
foundation.aapg.org

1-888-945-2274 ext. 2674
P.O. Box 979
Tulsa, OK 74101-0979
USA



Karl H. Arleth joined AAPG in 1951. Karl served as a Naval officer on a Subchaser in the Pacific Theater during World War II. After leaving the Navy, he earned a B.S. degree in Geology from Stanford University. Karl began his career in the oil and gas industry as a petroleum geologist with Ohio Oil Company in Bakersfield, California. After stints in Ventura and Sacramento, California, he transferred to Lafayette, Louisiana with Marathon Oil Company. In the years that followed, he worked for both Occidental Petroleum and Stone Energy in Houston until he retired in 1999. He continued to serve as a consultant to Stone Energy until 2008. At age 85, he passed away peacefully on Wednesday, June 16, 2010.

Throughout those years, Karl supported the AAPG Foundation and recently, the Foundation received a large contribution as a result of his bequest.

Karl's son, Karl F. Arleth, lives in Colorado and has been an AAPG member for 36 years and Foundation supporter since 2001.

Many thanks to the Arleth family. We honor Karl H. Arleth and will always be grateful for his faithfulness to the AAPG Foundation.



Same story, new audience: Riese spoke to 3,073 people at eight events while in New Mexico.

Continued from previous page

that the people across the state would know what was being done and could participate. And just to make sure that visibility was maintained, the reporters asked for two more radio and two more newspaper interviews at the various speaking venues.

And what about the community leaders, including teachers? How could they be engaged? Well, all those big-hearted supporters sponsored 60 eight-top tables at the convention center dinner event, which was to be the capstone event of the week, and then set about ensuring that all those seats would be filled.

And how did it turn out?
In the end, everyone's efforts paid off well. Students from 16 schools, colleges and universities had the opportunity to hear

Riese, who made eight presentations in 48 hours and was heard by approximately 3,000 people.

Four radio interviews and three newspaper interviews reached uncounted more – and if that wasn't enough, the week closed with two hours of call-in radio on KKOB radio in Albuquerque, which reached untold more.

Just as importantly, 32 sponsors contributed at levels sufficient to pay for the convention center, 600 meals, a reception and buses for students – and have \$100,000 "remaining" for scholarships.

This is how public outreach was meant to work!

Let's get after it, AAPG! ☑

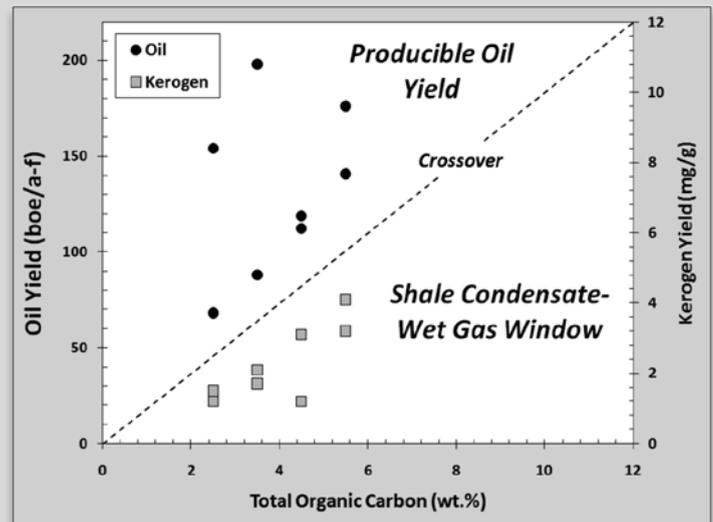
Editor's note: Swickard is president of the Triton Group in Roswell, N.M.

Resource HAWK™

State-of-the-Art Pyrolysis Instrument for laboratory, well site and office

Looking for tight oil or shale gas?

HAWK™ sees it best !



Wildcat Technologies, LLC

218 Higgins Street Humble, Texas 77338 USA
281.540.3208

info@wildcattechnologies.com

www.wildcattechnologies.com

We believe...
that our word is our bond.
What do you believe? Contract Disputes in Texas & Louisiana
Contingent Fee* | Hourly Fee | Hybrid Fee



LaGarde Law Firm, P.C.

Richard L. LaGarde
(713) 993-0660 | Houston, Texas
www.LaGardeLaw.com

* No fee if no recovery. Client is obligated for payment of court costs and expenses, regardless of recovery.

The Gulf Coast Association of Geological Societies and the Gulf Coast Section of SEPM

GCAGS Convention Oct 5-8, 2013 New Orleans



- The GOM Basin - the Big Picture
- Shallow-Water/Ultra-Deep plays
- Wilcox - the Up-, Down- & Between-Dip plays
- Gulf Coast Resource plays ● Offshore Mexico
- World-wide analogs to local plays ● Reservoir Management
- Converting Resources to Reserves to Revenue ● Enhanced Recovery
- New Seismic Acquisition Techniques & Revelations through Reprocessing
- Gravity, Magnetics & Geochemistry techniques ● Data Management
- New Regs & Permitting ● Spill Prevention, Clean-up & Recovery
- Coastal Restoration ● Geoscience Education & Hiring
- Economics - Oil/Gas, Shallow/Deep, Sand/Shale

HOSTED BY



ABSTRACTS of not more than 250 words should be submitted for review online or by email to the Technical Program Chair, George Rhoads (grhoads@chevron.com)

Submissions due no later than Dec. 2, 2012.
Notification of acceptance by Jan 13, 2013.
Oral and poster presenters must submit either a paper 10-12 pages or an extended abstract with key figures for review by at least two reviewers by March 23, 2013. Instructions for authors at www.GCAGS2013.com

You can reach about 32,000 petroleum geologists at the lowest per-reader cost in the world with a classified ad in the EXPLORER. Ads are at the rate of \$2.90 per word, minimum charge of \$60. And, for an additional \$50, your ad can appear on the classified section on the AAPG web site. Your ad can reach more people than ever before. Just write out your ad and send it to us. We will call you with the word count and cost. You can then arrange prepayment. Ads received by the first of the month will appear in the subsequent edition.

CLASSIFIED ADS

POSITION AVAILABLE

The University of Wyoming (UW) School of Energy Resources (SER) has a strategic initiative to establish international distinction in the area of unconventional reservoir characterization and development. This is an exceptionally well-funded partnership between UW, the state of Wyoming and the energy sector. In support of this initiative, UW is seeking to fill three (3) tenure-track/tenured positions from assistant to Full Professor, depending on qualifications, in GEOMECHANICS, PETROPHYSICS, and PETROLEUM SYSTEMS. The ideal candidate will bring expertise in experimental and/or computational approaches that enhance underground hydrocarbon extraction from unconventional reservoirs. These positions provide a unique opportunity to develop a cohort to shape the development of an internationally recognized program. Successful candidates will have a PhD that may include but is not limited to geology, geophysics, chemical engineering, petroleum engineering, mechanical engineering, civil engineering or mathematics. Applications are encouraged from candidates from academic, energy industry, or governmental backgrounds. It is anticipated that the positions will develop strong multidisciplinary R&D

collaborations between academia and industry. Flexible teaching responsibilities will include contemporary undergraduate and graduate courses.

The University of Wyoming is a thriving, well-funded research university with over 13,000 students. SER (<http://www.uwyo.edu/ser/>) coordinates UW's energy focus and promotes robust industry alliances. State-of-the-art facilities include the new \$30M Energy Innovation Center, the NCAR-Wyoming Supercomputing Center, Advanced Research Computing Center, and 3D Visualization Center. Related to exploiting unconventional reservoirs, UW has a critical core of highly research active faculty and students in the departments of Chemical & Petroleum Engineering, Geology & Geophysics, Civil Engineering, Mechanical Engineering, and Mathematics (see <http://www.uwyo.edu>). UW is located in Laramie, Wyoming (pop. 30,000, <http://www.laramie.org/>) 130 miles northwest of Denver. Laramie is a picturesque and friendly town, offering a reasonable cost of living with easy access to superb outdoor activities in Rocky Mountains region.

Applications must include a letter of application, a CV, a statement of teaching and research interests, and contact information for four references. Review of applications will begin January 1, 2013 and continue until the position is filled. Applications should be submitted electronically to pamelah@uwyo.edu.

**BASIN RESEARCH AND ENERGY GEOLOGY
STATE UNIVERSITY OF NEW YORK at BINGHAMTON**

Binghamton University seeks applications for a tenure-track position in sedimentary basin research at the assistant or associate professor level to begin in August 2013. We seek exceptional candidates with research and teaching interests in basin-scale processes. Areas of interest include but are not limited to: clastic depositional systems; basin-scale diagenesis; geophysical modeling; depositional modeling; tectonic modeling; and modern stratigraphic analysis. A fundamental understanding of well logs and seismic analysis is essential, although candidates need not be expert in these petrophysical tools.

The successful candidate must develop and sustain a nationally recognized, externally funded research program in basin analysis. We also expect the candidate to develop a strong record of teaching and mentoring students and teach undergraduate and graduate level courses in his/her area of expertise. We are seeking candidates who will strengthen existing research programs in geochemistry, sedimentary geology, or Earth surface processes with the potential to interact with geologists, environmental scientists and engineers on the Binghamton University campus.

Candidates must have a Ph.D. with a focus in basin research or a related field, at the time of appointment; preference will be given to candidates with post-doctoral research or industry experience. Interested candidates should submit a letter of application, curriculum vitae, statements of research and teaching interests, and names and contact information of at least three references to the Binghamton University Interview Exchange site at <http://binghamton.interviewexchange.com>. For further information about the position, visit the Geological Sciences and Environmental Studies website (www.geology.binghamton.edu) or contact Professor Karen Salvage by email: ksalvage@binghamton.edu.

Women and minorities are encouraged to apply. Binghamton University is strongly committed to affirmative action. Recruitment is conducted without regard to race, color, sex, religion, disability, marital status, sexual orientation, or national origin. Applications will be considered until the position is filled, but priority will be given to those received by November 30, 2012.

Hydrogeology/Earth Fluids Faculty Position

The School of Earth Sciences in the College of Arts and Sciences at The Ohio State University invites applicants for a newly established tenure-track position in Hydrogeology/Earth Fluids. Information about the School of Earth Sciences can be found at <http://www.earthsciences.osu.edu>.

We are seeking applicants with a doctoral degree and a wide-range of interests in the flow of fluids related to energy and environment. The candidate's research interests should cut across and support the focus areas of the School's Strategic Plan: Energy Sciences, Deep Earth-Deep Time, Measuring a Changing Planet, and Climate and Water and the University's Energy and Environment Discovery Theme. Applicants will have skills and interests in the subsurface movement of oil, gas, and/or water. These interests could include determining reservoir/aquifer properties, multiphase and variable-density fluid flow, solute/heat transport, and environmental impacts of resource extraction. An ability to characterize small-scale phenomena to study larger-scale processes is desired. Examples of advanced capabilities could be use of isotopic tracers to examine flow paths hydrocarbons, contaminants, and/or groundwater; geophysical/fluid flow techniques in support of modeling; impact of petroleum/gas extraction on ground-water quality; and novel techniques and modeling for the development of unconventional and conventional oil and gas resources, and flow regimes.

The successful applicant is expected to have a developing record of research achievement through publications. The new faculty member will contribute to teaching in our graduate programs and in our undergraduate curriculum. Our Bachelor of Science program contains four tracks, geological sciences, Earth system sciences, geophysics, and petroleum geology. The new hire is also expected to develop a research program and generate external funds. The position will be filled at the rank of Assistant Professor. Applications will be reviewed beginning November 1, 2012. The anticipated start date is September 1, 2013.

Applicants should submit a letter of application, curriculum vitae, and statements of research interests and teaching philosophies to:

Hydrogeology/Earth Fluids Search Committee
School of Earth Sciences
275 Mendenhall Laboratory
125 S. Oval Mall
Columbus, OH 43210-1398

Email applications as a single, compiled pdf will also be accepted at fluids-search@earthsciences.osu.edu.

The candidate should provide names of at least three references who may be asked to write letters of recommendation.

To build a diverse workforce, Ohio State encourages applications from those with disabilities, minorities, veterans, and women. Ohio State is an NSF ADVANCE institution and an EEO/AA employer.

Seismology Faculty Position

The School of Earth Sciences (SES) in the College of Arts and Sciences at The Ohio State University invites applications for a newly established tenure-track position in Seismology. Information about the School of Earth Sciences can be found at <http://www.earthsciences.osu.edu>.

We are seeking applicants with a doctoral degree and interests that support the SES Strategic Plan's focus areas in Energy Science and Deep Earth-Deep Time. Applicants will have skills and interests in both basic and applied research in such areas as energy exploration, reflection seismology, subsurface characterization, earth structure, history and dynamics, or natural hazards. We are seeking individuals who will work across disciplines within SES and collaborate with faculty specializing in energy and mineral physics, stratigraphy, structural geology, geodesy and tectonics. The successful candidate will be one whose research focus in seismology is oriented toward the energy sciences, and who is able to teach basic earthquake and reflection seismology as well as educate students for the energy industry.

The successful applicant is expected to have a developing record of research achievements including

Continued on next page

Newfield by the Numbers

A strong portfolio of nearly 2.5 million net acres, and still growing



We're exploring for great talent to join our exceptional family of employees as we continue to expand and develop our portfolio. An independent company founded in 1989, Newfield Exploration is focused on our people and our communities, with an equal focus on diversified assets and unconventional plays. We offer competitive compensation, comprehensive benefits, and performance-based incentives. Strong interpersonal skills, teamwork, entrepreneurial spirit, unique knowledge and skills—these are the hallmarks of Team Newfield. Join us. And grow with us.

Newfield is currently seeking **experienced geoscience professionals** in our Mid-Continent region:

- Petrophysicists
- Geophysicists
- Geological Technicians
- Geologists

Learn more and apply online. Visit Careers at:
www.newfield.com/careers

www.newfield.com



EMD
from page 70

the Eastern Section since the Atlanta convention in 1986.

With abstracts in, it's a busy time to assemble sessions in the topical themes. EMD will be sponsoring several workshops, short courses and field trips, as well as technical sessions in Theme 1 – which is, of course, "Unconventional Resources."

The next EMD column in February coincides with a new year, and possibly a new U.S. president in the White House. We can hope gas prices will have increased over today's \$3.20 benchmark, and rig counts will remain constant or better.

Although the future is uncertain, it would seem that energy will remain a relevant and dominant topic (both domestically and internationally), and as such, 2013 could again be another good year for geoscientists – and EMD. ☐

Continued from previous page

publications. The new faculty member will be expected to teach graduate and undergraduate courses. Our Bachelor of Science program has tracks in geological sciences, earth system science, geophysics, and petroleum geology & geophysics. The new hire is also expected to develop a research program and generate external research funds. The position will be filled at the rank of Assistant Professor. Applications will be reviewed beginning November 1, 2012. The anticipated start date is September 1, 2013.

Applicants should submit a letter of application, curriculum vitae, and a statement of research interest and teaching philosophy to:

Seismology Search Committee
School of Earth Sciences
275 Mendenhall Laboratory
125 S. Oval Mall
Columbus, OH 43210

Email applications, as a single, compiled pdf file will also be accepted at: seismo-search@earthsciences.osu.edu.

The candidate should also provide at least three references who may be asked to write letters of recommendation.

To build a diverse workforce, Ohio State encourages applications from those with disabilities, minorities, veterans, and women. EEO/AA employer. Ohio State is an NSF ADVANCE institution.

**Assistant, Associate or Professor
Geology and Geological Engineering**

The Department of Geology and Geological Engineering at the South Dakota School of Mines and Technology invites applications for a nine-month tenure track position at the Assistant, Associate or full Professor level. We seek candidates specializing in basin analysis and tectonics with expertise in one or more of structural geology, petrology, geophysics, or another field complementing department strengths. The successful applicant should be able to teach/develop courses in their specialty at both the undergraduate and graduate level, to advise graduate students, and to develop an externally funded research program. The department offers BS, MS, and Ph.D. degrees in Geology and Geological Engineering and a minor in Geospatial Technology, with emphases in hydrology, geotechnics, petroleum, mineral resources, and paleontology. A completed Ph.D. in Geology, Geological Engineering or a closely related field is required.

Individuals interested in this position must apply online at www.sdsmt.edu/employment. Human Resources can provide accommodation to the on-line application process and can be reached at (605) 394-1203. Review of applications will begin January 15, 2013, and will continue until the position is filled. Employment is contingent upon completion of a satisfactory background investigation. SDSMT is an EEO/AA/ADA employer & provider.

**Pevehouse Chair in Geosciences
An Endowed Position in Petroleum Geosciences
Texas Tech University**

The Department of Geosciences at Texas Tech University invites applications for the Pevehouse Chair in Geosciences. The purpose of this endowed position is to support innovative research and education focused on the origin, exploration, and recovery of conventional and unconventional hydrocarbon resources. A Ph.D. in geosciences or closely allied field is required, as is a record of petroleum-related research as demonstrated by professional publications. The chair holder is expected to conduct a vigorous, externally-funded research program that may involve collaboration with the petroleum industry. The successful candidate will teach graduate and undergraduate courses, and direct graduate student research. The position is expected to be filled at the tenured full professor level. Texas Tech University will continue to strengthen research and education in petroleum geoscience by adding a new junior faculty member to this program in FY 2014.

Texas Tech is a state-supported, graduate research-oriented university with over 32,000 students. The Department of Geosciences consists of twenty-four tenured/tenure-track faculty, with teaching and research emphases in solid earth geosciences, atmospheric

science, and geography. It offers degree programs in solid earth geosciences at the BS, MS, and Ph.D. levels. The department currently has more than 200 undergraduate majors and more than 60 graduate students. The department computer labs are well-equipped with GIS, geologic mapping/modeling, and seismic processing/interpretation software packages. Available experimental/analytical facilities include a stable isotope laboratory, laser ablation ICP-MS, ICP-AES, TEM, SEM, XRF, XRD, a heat flow lab, and remote sensing spectroradiometers. Additional information on the department can be found at website <http://www.depts.ttu.edu/geosc/>. In addition, the Department of Petroleum Engineering maintains experimental and analytical facilities in petrophysics, drill fluids, cement, enhanced recovery, and reservoir simulation, as well as X-ray CT/nuclear magnetic resonance imaging lab. Lubbock is located on the Southern High Plains in close proximity to the Permian Basin. The city has a population of over 225,000 and the semi-arid climate is conducive to outdoor activities. Cultural amenities include musical, theatrical, and sports events, and the city offers numerous options for shopping and dining. The city also offers the best healthcare facilities in the region, including the university's Health Sciences Center. The cost of living is low compared to national norms.

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

E-mail questions regarding the position are received at cal.barnes@ttu.edu. Review of applicants will begin January 1 and continue until the position is filled.

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

Carbonate Stratigrapher

Chevron Energy Technology Company is accepting online applications for the position of Carbonate Stratigrapher, located in Houston, Texas. The Carbonate Stratigrapher / Sedimentologist will work with and integrate various data sets. The position will be based in Houston, Texas although considerable international & domestic travel is expected. Responsibilities include: Describe core and thin sections to create sequence stratigraphic and diagenetic frameworks to predict reservoir properties. Liaison with reservoir modelers, petrophysicists, and engineers. Perform well correlation and facies mapping, interpret seismic data, and identify leads and prospects.

A Master's Degree in Geology, along with 5 years of industry experience as a carbonate specialist. To apply or learn more about this position, please go to <http://www.chevron.apply2jobs.com/>, Requisition # 032223435.

MISCELLANEOUS

SAMPLES TO RENT

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

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

Eliminate pilot holes and drill more horizontal payzone with SES technical **GEOSTEERING SOFTWARE!** SES is for geologists who are dissatisfied with drafting-tool methods of geosteering. Free trial. www.makinhole.com. Stoner Engineering LLC.

UNIVERSITY of
HOUSTON

Faculty Positions University of Houston

The Department of Earth and Atmospheric Sciences of the University of Houston invites applicants for the following tenure track faculty positions. Candidates must have completed their PhD at the time of appointment. Successful candidates will be expected to build a vigorous externally-funded research program, and should be able to demonstrate productivity in peer-reviewed publication. Candidates will also be expected to teach at both the undergraduate and graduate levels and will be expected to mentor MS and PhD students. We expect to fill the positions by August, 2013. Candidate evaluation will begin November 12, 2012 and continue until the position is filled.

Exploration Geophysics

Assistant to Full Professor level in the field of Exploration Geophysics, specializing in reflection seismic processing, imaging, and interpretation. We seek candidates of outstanding ability in signal processing, algorithm development, and seismic data analysis. Strength in subjects such as elastic-wave propagation, tomography, migration, and inversion will be especially valued. The successful candidate should have the ability to use high-performance computing to image, visualize, and interpret seismic data and will have use of our wide variety of seismic software packages, hardware systems, and geophysical data. The successful candidate will participate with an enthusiastic team of geophysics faculty and students in one of the leading energy communities in the world. Preference will be given to candidates with related industry experience.

Organic Geochemistry

Assistant to Full Professor level in the broad field of organic geochemistry. Applicants should have experience in the application of chemical principles to the study of the origin, migration, accumulation, and alteration of hydrocarbons and organic contaminants using a range of petroleum geochemical techniques, such as stable isotope geochemistry, hydrocarbon analysis of organic compounds and biomarkers with GC and GC-MS, vitrinite reflectance or other maturity indicators, laboratory pyrolysis, and/or kerogen typing. The successful candidate will also enjoy access to new major and sophisticated organic geochemical research equipment being delivered in the Fall of 2012 to the Department, including an Agilent GC-QQQ 7000, an Agilent GC-Q-TOF 7200, an Agilent GC-MS 5975, an Agilent GC 7890, a Finigan Delta 5 Gas Stable Isotope Mass Spectrometer coupled with a GC-C-IRMS, and a Rock Eval VI Pyrolysis Instrument. Research analytical expertise in these instruments and/or experience in related environmental organic fluid and rock geochemistry, especially aligned with studies of water quality, identifying natural water and rock contaminants and toxicity levels, carrying out epidemiologic environmental forensics studies, environmental remediation monitoring, and/or ground water quality studies in gas and oil shale fracking regions, is considered advantageous to the broad areas of research in the Department.

Sedimentary Geology

Assistant Professor level in the general field of Sedimentary Geology and Stratigraphy. Candidates may conduct research on ancient or modern systems and may have expertise in areas such as facies and stratigraphic architecture, sedimentary petrology, experimental or numerical modeling, and/or reservoir characterization. Ideally the candidate will have experience with field-based research to solve fundamental geological problems. This position is linked to the UH Energy initiative, and we encourage applications from candidates with some industry experience.

Information for Applicants

Candidates for each position should submit: 1) a letter of application including statements of teaching and research interests, 2) a curriculum vitae, and 3) three letters of reference (letters must be received before the applications will be considered) to:

Dr. Janok P. Bhattacharya, Chair,
Department of Earth and Atmospheric Sciences
College of Natural Sciences and Mathematics
Room 312 Science Research 1
University of Houston
4800 Calhoun Rd.
Houston, Texas 77204-5503.

Signed reference letters may be submitted by referees as attached files via email to Penny Maher: plmaher@uh.edu. Further information can be obtained by viewing the departmental web page at <http://www.geosc.uh.edu/> or by calling the Department at (713) 743-3399.

The University of Houston is an Equal Opportunity/Affirmative Action Employer. Minorities, women, veterans, and persons with disabilities are encouraged to apply.



Energy Progress Is Beginning, Step By Step

By DAVID K. CURTISS, AAPG Executive Director

There is no question that shale gas has transformed the U.S. energy supply picture.

It began with George Mitchell, the “father of shale gas,” and the Barnett Shale. And in retrospect it almost looks inevitable.

But if you’ve heard the story, you know it was anything but easy. It took patience and persistence, new technology and scientific understanding, and no small amount of guts to produce the natural gas in the Barnett. It was the accumulation of small advances through trial and error that opened an entirely new play concept.

In his book, “Why We Hate the Oil Companies,” former Shell President John Hofmeister describes “energy time,” and the reality that energy development and transitions operate on a decadal time scale.

In fact, Mitchell’s achievement in opening the Barnett play is often described as an overnight success, 20 years in the making.

But that success has ushered in a new era in petroleum exploration and production, with natural gas growing as a percentage of the U.S. energy portfolio.

* * *

The first stage of this new era was dramatic growth in natural gas reserves and supplies. The principal driver was the relatively high price of natural gas, which attracted the investment needed to develop reserves and increase supply. This increased supply, in turn, drove prices down



CURTISS

Low natural gas prices are currently fueling the second stage of this new era: growth in demand for natural gas, both for power generation and as a transportation fuel.

– way down.

Low natural gas prices are currently fueling the second stage of this new era: growth in demand for natural gas, both for power generation and as a transportation fuel.

The United States is a laggard when it comes to using natural gas in transportation – but that situation is changing.

For instance:

▶ As we discussed last month, a coalition of 22 states is asking Detroit automakers to respond to a request for proposals for fleet vehicles fueled by compressed natural gas.

▶ Similarly, in late September a group of over 800 people met in Houston for the first ever Natural Gas for High Horsepower Applications (HHP) Summit. The meeting focused on efforts to shift high horsepower engines to liquefied natural gas (LNG). The applications discussed were principally off-road applications, such as marine, mining, rail, construction and earth moving.

“We’ve decided to go all-in on gas,” said Joel Feucht, Caterpillar’s director of gas engine strategy for the energy and power systems businesses, at the HHP Summit. “We are going to invest because we see a global market long term.

“Large engines are going gas,” he said. “It’s not debatable; it’s our conclusion.”

▶ During that same week in September attendees at the AAPG’s Eastern Section meeting in Cleveland had the opportunity to hear a keynote address by Thomas O’Brien, managing director, president and CEO of TravelCenters of America (TA) on its plans to install LNG fueling facilities at its truck stops.

TA is the largest operator of full-service travel centers in the United States, with more than 200 facilities located across the interstate highway system. Its principal client is the long-haul trucker. And these interstate motor carriers move over 70 percent of all domestic U.S. freight tonnage, according to the American Trucking Association.

They are increasingly looking at natural

gas as a fuel source.

According to the plan first outlined in June and still under development, TA would cooperate with Shell to install more than 200 LNG fueling lines at 100 of its facilities. The first lines would be operational in 2013.

“Using natural gas for transport gives truck fleet operators a new strong advantage, because it’s abundant and affordable and a viable alternative to diesel,” said Elen Phillips, vice president, Shell Fuels Sales and Marketing North America.

* * *

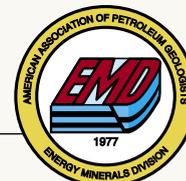
It’s a new era. These changes won’t happen overnight – they never do in energy.

But they’ve started, beginning with significant growth in natural gas supplies. And they’re continuing with the development of technology and infrastructure needed to support a fuel switch of fleet vehicles, long haul trucks and high horsepower engines for off-road applications.

Natural gas is increasingly a viable option for all of these modes of transportation – and the pieces are falling into place for accelerating adoption of these new engine technologies.

DIVISIONS REPORT

Bridging Public, Politics and Production



By ANDREA REYNOLDS, EMD President

We live in interesting times:

▶ It’s an election year in the United States, where energy is a visible part of the conversation.

▶ Our industry has been very good at finding and delivering natural gas – so good that we’ve got a surplus.

▶ This surplus is keeping consumer prices down and driving gas-based industrial developments. North American shale gas and tight oil plays have been gaining momentum in the last five years, mostly as a result of geoscientists and engineers finding out we can speak the same language.

In short, it’s a very good time to be a geologist.

I’d also add that it’s been a particularly exciting time to be an EMD member.

* * *

AAPG’s Energy and Minerals Division (EMD) has been quite active throughout these last few years as “unconventional” plays have grown and expanded to become a regular part of most companies’ portfolios.

EMD also has seen changes – we’ve removed our dues, grown our membership and adapted to remain technically current. Like AAPG, our mission is to advance the science of geology – but specifically as it relates to unconventional and alternative energy sources.

In case you’re new to EMD, our commodities include Coalbed Methane,



REYNOLDS

Although the future is uncertain, it would seem that energy will remain a relevant and dominant topic ... 2013 could again be another good year for geoscientists and EMD.

Gas Hydrates, Tight Gas Sands, Gas Shales, Oil Sands, Oil Shale, Coal, Uranium, Geothermal Energy and Renewable Energy, jointly run with AAPG’s Division of Environmental Geology (DEG).

If you’re working these commodities, or if you’re interested in learning more, you should consider joining EMD.

As the focus on unconventional resources has become more visible to the public – and ever more scrutinized – it has become increasingly important to understand not only the typical subsurface risk that we as scientists are accustomed to facing, but this focus now requires all of us to add new skills to our toolbox, so that we can better identify, consider and manage additional risks relating to surface access, environmental concerns/mitigation, water sourcing and various levels of stakeholder engagement – just to name a few.

While much public attention has focused on shale gas, many of these same concerns can be raised with just about all EMD commodities.

Due to mounting interest in these non-technical issues, EMD is actively promoting new Geoscience Technology Workshops (GTWs) through the AAPG education department, as well as planning and organizing EMD co-branded sessions at AAPG meetings – including short courses, workshops and technical sessions at Section, annual and international conferences.

EMD recently partnered with DEG to co-sponsor a GTW in Golden, Colo., in August to address “Hydraulic Fracturing: New Controversies and Key Plays, Including Niobrara.” GTWs offer a unique setting to allow speakers and attendees time for ample discussion, with a typical GTW attracting between 70-120 participants.

The feedback from this specific workshop was highly positive, and EMD and DEG are pursuing options to repeat similar workshops tailored to specific plays in Appalachia (Marcellus, Utica) and/or the Gulf Coast and Mid-Continent (Haynesville, Eagle Ford, Mississippi Lime), among others. Already, we’re collaborating on a new GTW with DEG titled “Solving

Water Problems in Oil and Gas Production: New Technologies for Cost Savings and Revenue Flows,” planned for Feb. 26-27 in Fort Worth.

* * *

In a first for AAPG, the recent Singapore ICE meeting opened with a plenary session focused on “Unconventionals in Southeast Asia,” which attracted upwards of 700 people – nearly one third of the ICE’s attendees.

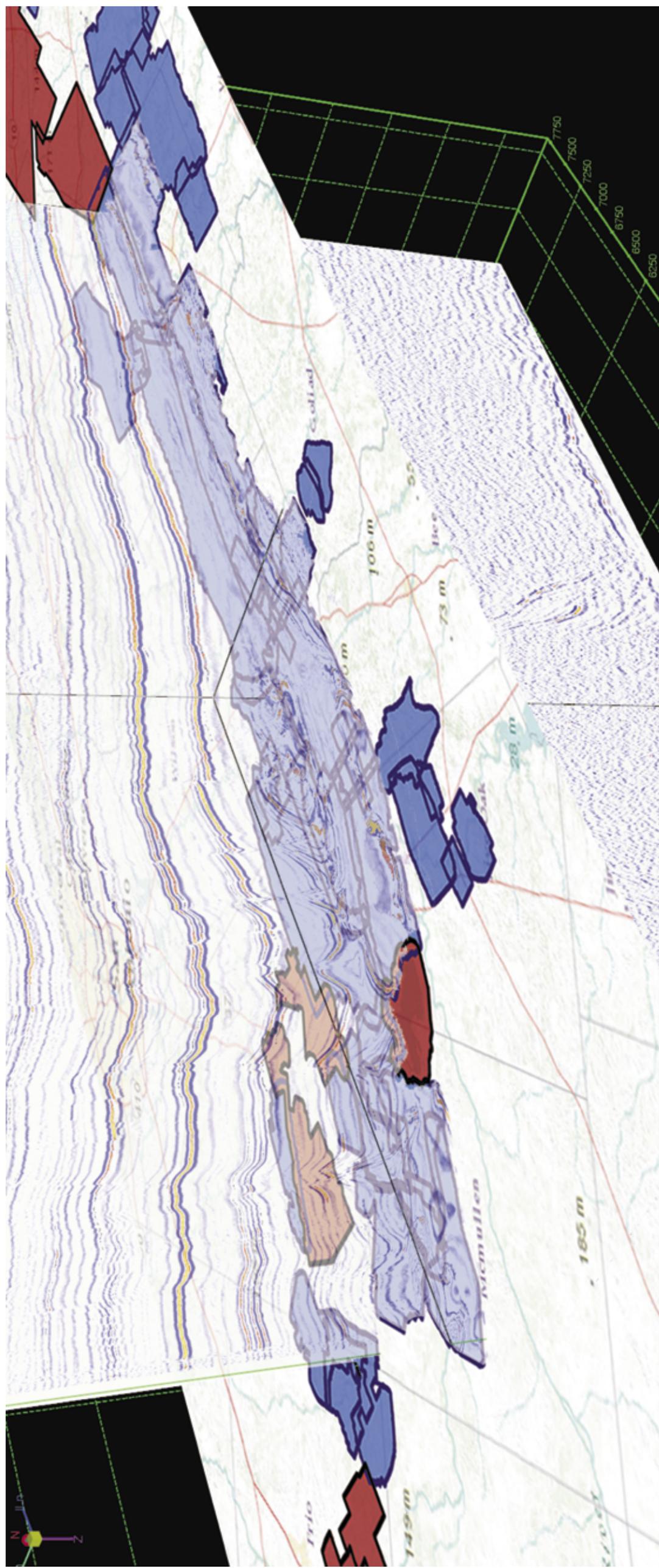
The EMD-sponsored session featured an interactive panel discussion moderated by Scott Tinker, and included speakers from various sectors of industry.

The challenges in SE Asia unconventionals are quite different to those in the more established North American plays. Concerns around infrastructure, government-ownership of mineral rights, timing of a coal to natural gas product stream and political differences by country were highlighted in the highly energized discussion.

While unconventional gas appears abundant in Southeast Asia, getting at it will take time with long-term investment in infrastructure – and a drive to change the energy landscape.

At press time, EMD also was preparing an active program for the 2013 ACE in Pittsburgh – and that will be the first AAPG annual meeting to be held in

See EMD, page 69



The seismic image shown is over 2,150 square miles of merged data in the Eagle Ford play.

start with **Seitel.** end with **Production.**

Seitel gets results for customers, period. For more than 30 years we have braved treacherous terrain and harsh weather to deliver the data our customers need to make smart drilling decisions. From independents to the world's supermajors, companies constantly count on us for our extensive libraries, new acquisition capabilities and processing expertise. No matter how big or small your project, **Seitel** will come through for you.

- Quality 2D and 3D data sets
- Acquisition management
- Fast-track processing
- Pre-stack depth migration
- Azimuthal analysis
- Custom solutions

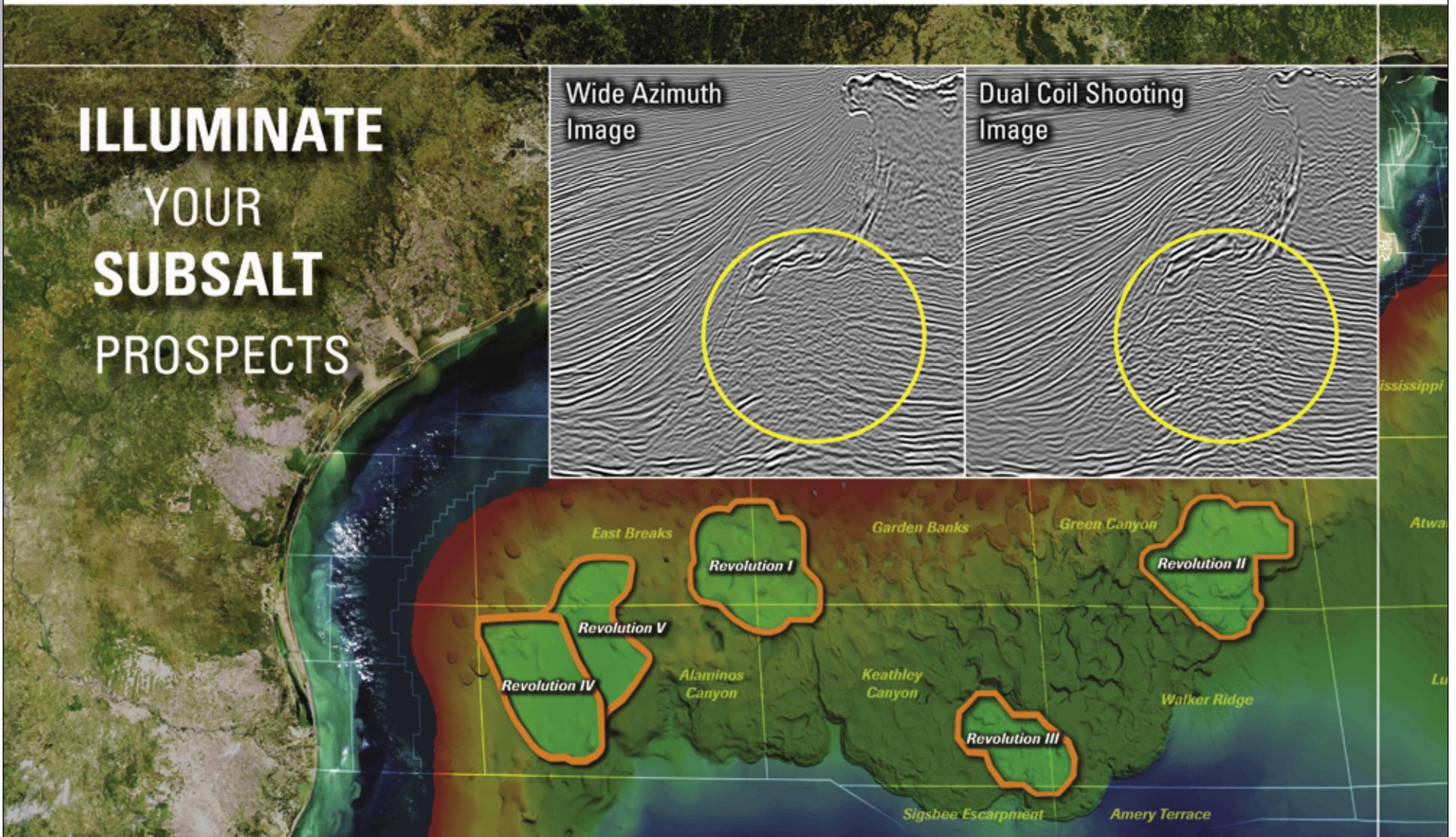


seitel.com

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



Multiclient Services



**ILLUMINATE
YOUR
SUBSALT
PROSPECTS**

Superior subsalt images delivered in deepwater Gulf of Mexico

Revolution multiclient surveys in the Gulf of Mexico are being acquired with Dual Coil Shooting* multivessel full-azimuth (FAZ) acquisition, which captures ultralong offset marine seismic data via a circular path. Data from the Revolution surveys also benefit from high-end processing technologies such as full waveform inversion (FWI) and anisotropic reverse time migration (RTM). The result: higher fidelity seismic images, delivered efficiently—even beneath salt.

To learn more about the Revolution multiclient surveys and Dual Coil Shooting acquisition, call +1 713 689 1000 or e-mail us at multiclient@slb.com.

www.slb.com/revolution



*Mark of Schlumberger. © 2012 Schlumberger. 12-SE-0088