AAPG EXPLORER

MARCH 2010

Pending Possibilities

But Iraq's potential moves closer to reality

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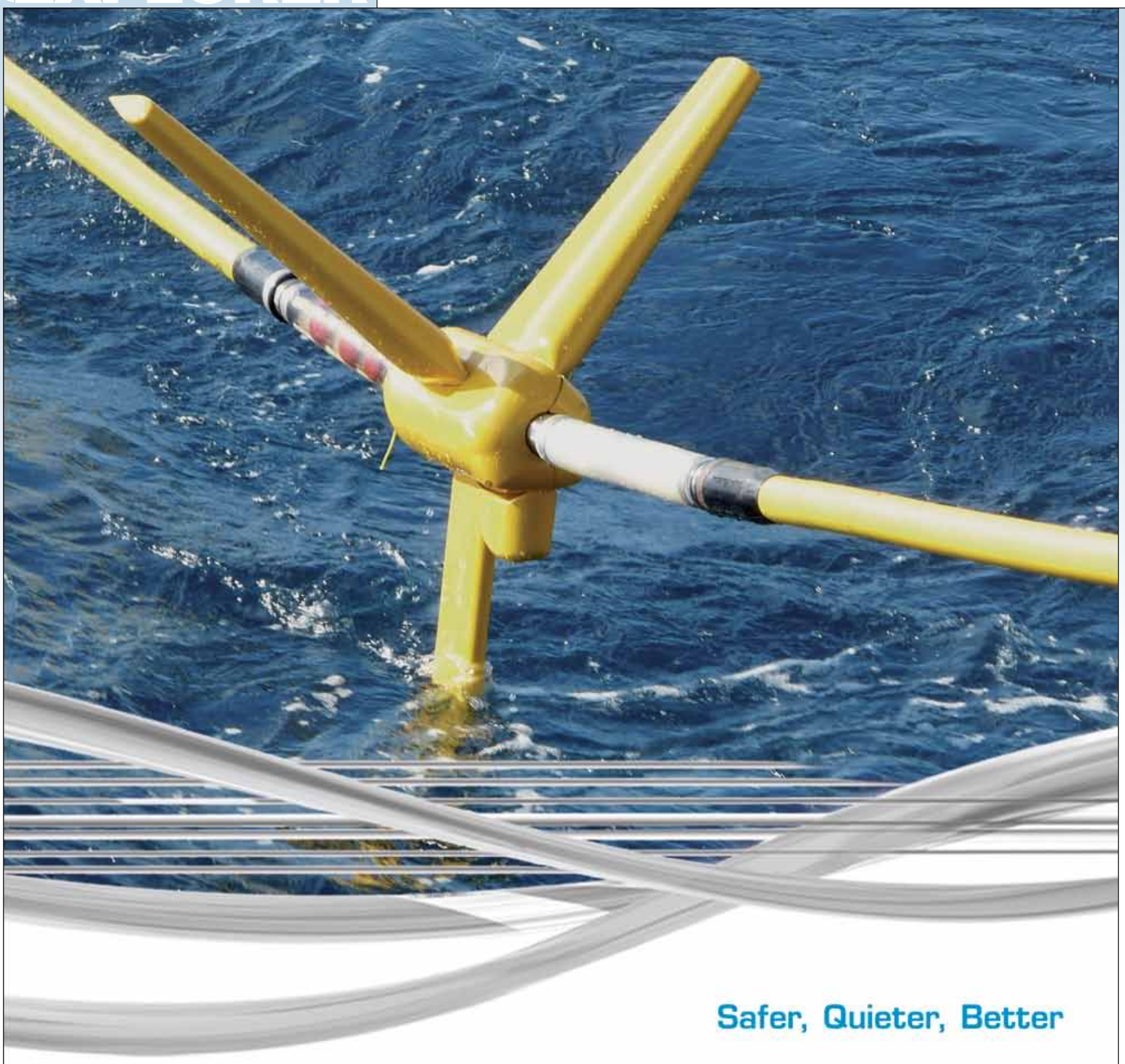

Vol. 31, No. 3
March 2010

AAPG EXPLORER

PRESIDENT'S COLUMN

The Energy Ratio Limit

By JOHN C. LORENZ


LORENZ

> Our job as geologists is to use the best available geoscience when picking drilling locations and determining completion techniques.

Growing up during the Lower Diluvian epoch, when my father got us out of bed to watch Sputnik blink across the sky as the world's first satellite and we began to learn new math instead of arithmetic, gasoline for the family dinosaur cost about $0.33/gallon. Since then, inflation has raised the price of U.S. postage stamps from $0.04 to $0.44, the model airplanes I bought as a youth for $1.06 now cost about $15, and the cost of groceries has increased significantly.

By these subjective measurements, in the United States that $0.33 gallon of gasoline should now cost well over $3 just to account for inflation, with an additional price bump to cover the fact that oil and gas have become harder to find and produce. Believe it or not, gasoline and other hydrocarbon products are better bargains now than they were 50 years ago, and given the improved fuel economy of modern cars we probably spend a lower percentage of our income on gasoline than we did back then.

Even so, many complain about the price of hydrocarbons, unwilling to allow for the fact that the oil and gas industry is a business that depends on an economic return for the effort. We don't explore for oil and gas just for the sake of proving theories about the presence/absence of an oil pool, even though that is the fun, scientific part of the job. And since an economic return is necessary, known fields containing millions of barrels of oil remain untapped because it would cost more to extract and transport the oil than could be recovered by its sale. Such dollar limits change with product prices, thus many such fields can and will be produced when prices for oil and gas increase.

However, there is a different and less flexible energy-budget limit involved in the production of fossil fuels. As long as oil is being recovered for use primarily as an energy source, no one can afford to expend the amount of energy found in a barrel of oil in order to drill for, pump out, and transport less than a barrel of oil.

Jeremy Boak is the new chair of the AAPG Energy Minerals Division Oil Shale Commodity Committee, and professor at the Colorado School of Mines. According to Boak, the ratio between 1) the energy expended in obtaining oil, and 2) the energy recovered by the process* was probably 1:100 or better for new wells in the era of easy oil, but the ratio has fallen to 1:20 or even 1:10 as that oil has been depleted. The ratio is even less for mature fields that require advanced oil recovery techniques, where Boak suggests that the ratio is below 1:10. So far, efficiency gains through better science and technology have kept the ratio from declining to the point where, as with corn-based ethanol, it's debatable whether a net energy benefit exists.

Ultimately, even when over half the oil remains in the ground, industry makes the decision to abandon a field when it takes more money and energy to recover the oil than can be extracted from the recovered oil. And with many conventional fields reaching their production capacity limits we are again looking at extracting fossil energy from the immature kerogen in oil shale formations, where Boak says the energy-in/energy-out ratio is only between 1:3½ and 1:5. The renewed interest in this and other unconventional resources is an indirect indication both of industry's internal forecasts for energy demands and of how close to the bone we are getting.

Rising oil prices will only go so far in promoting recovery of the world's fossil energy resources. The laws of physics limit how much oil and gas can be recovered from small, deep, or remote fields as long as we don't intend to put more energy into the ground than we extract from it. Once we develop reliable and inexpensive alternative energy sources we may use hydrocarbons primarily for purposes such as chemical feedstock instead of merely burning them, whereupon they could conceivably become more valuable than the energy they contain. In the meantime, our job as geologists is to use the best available geoscience when picking drilling locations and determining completion techniques. Every day, AAPG members are advancing the science and technology that help keep the energy ratio favorable.

* Described as the "EROI," the energy return on investment, by Cleveland, C.J., 2005, "Net energy from the extraction of oil and gas in the United States," Energy, v. 30, p. 769-782.

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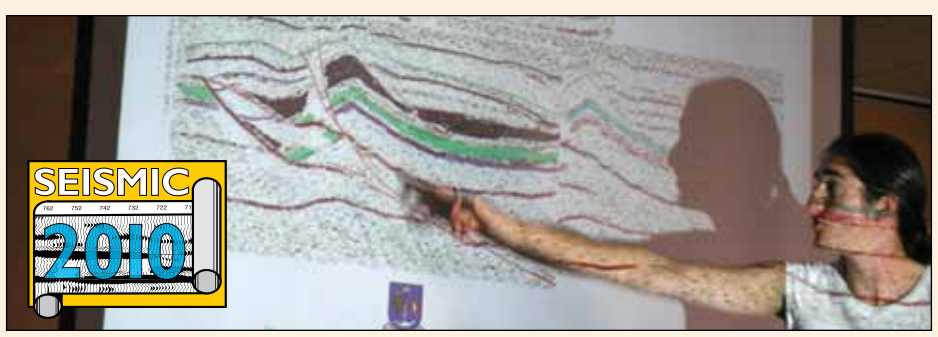

REGULAR DEPARTMENTS

ON THE COVER:

The Shaikan1-B discovery well, located in Iraq's Kurdistan province near the city of Dohuk, about 85 kilometers northwest of Erbil. The well, drilled by Gulf Keystone Petroleum in spring 2009, reached TD at 2,950 meters measured depth and encountered nine hydrocarbon-bearing formations within Cretaceous, Jurassic and Triassic deposits. The Shaikan structure is an east-west anticline at the northwestern part of the Zagros/Taurus Foldbelt. Photo courtesy of AAPG member Chris Garrett.

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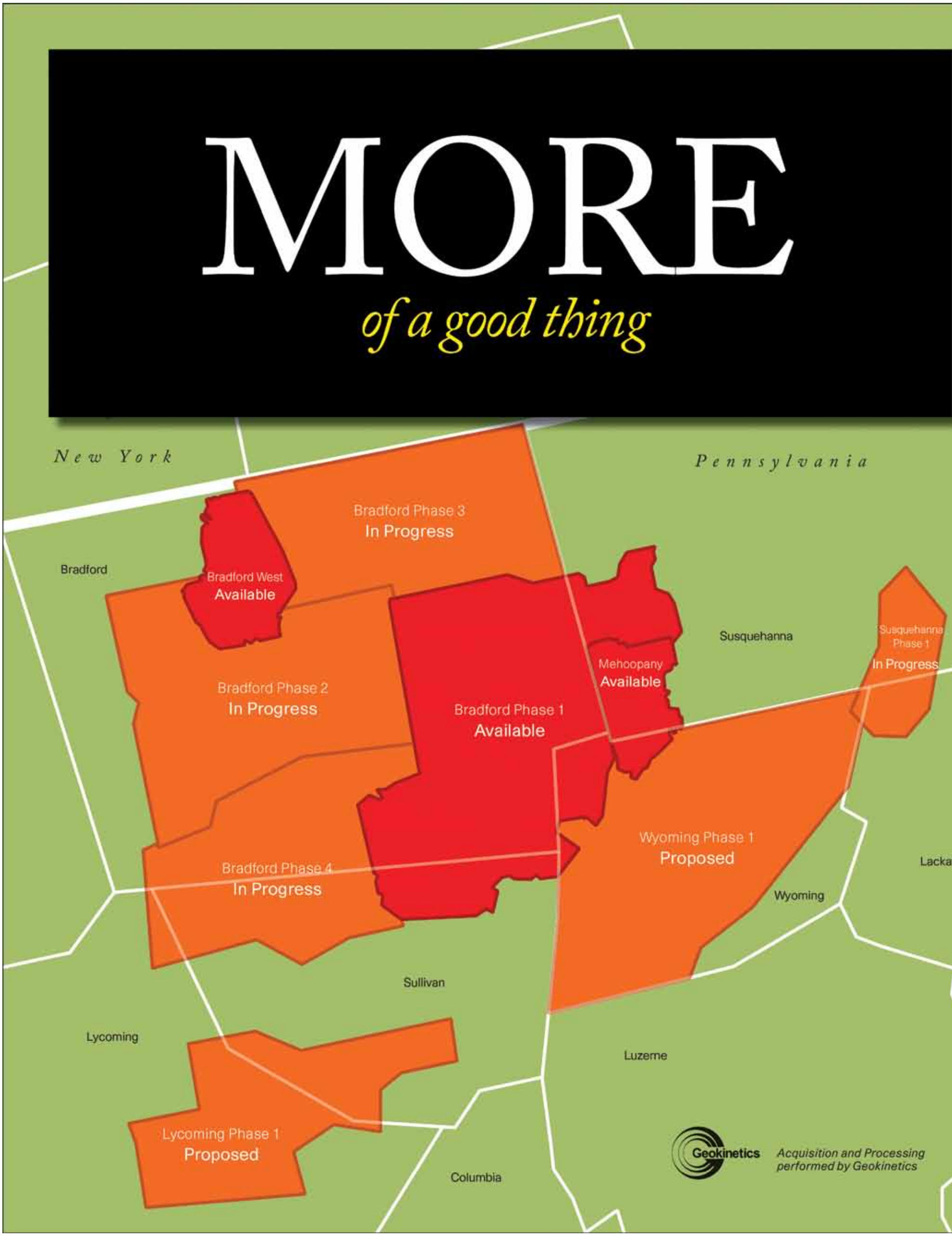
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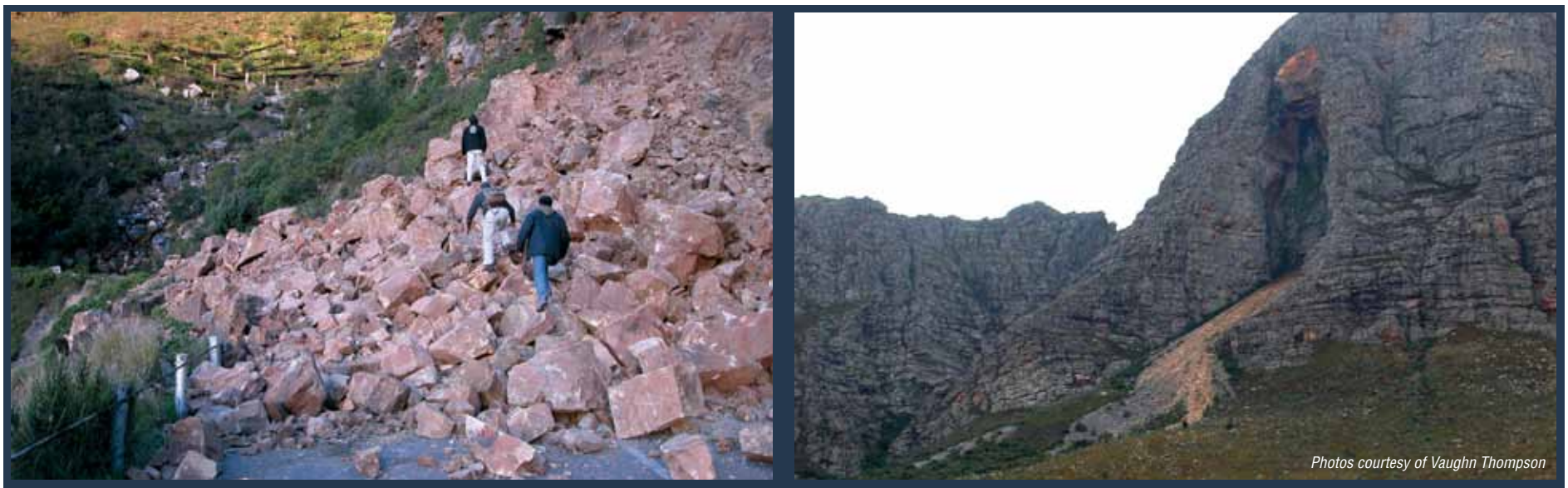


Photos courtesy of Vaughn Thompson

Evidence of geohazards in South Africa: Left, a rock slide on Tafelberg road (Table Mountain), right, another rock slide episode within siliciclastic Cape Supergroup of South Africa, near Cape Town.

Haiti indicators studied

Geohazards Lurk in Familiar Places

By DAVID BROWN, EXPLORER Correspondent

An earthquake in Haiti brings widespread death and destruction. A volcano erupts in the Philippines and 50,000 evacuate. A massive landslide destroys homes in San Diego.

Dangerous stuff, geology.

In the United States, geological hazards are monitored and studied by the U.S. Geological Survey. The USGS Geologic Hazards Team has its headquarters in Golden, Colo.

It works in earthquake-hazard, landslide-hazard and geomagnetism programs and partners in the Global Seismographic Network (GSN). Additional earthquake research and monitoring is conducted in USGS offices in Menlo Park, Calif., Seattle and Anchorage, Alaska.

The GSN provides worldwide monitoring of the Earth, with more than 150 seismic stations distributed globally.

"In the case of Haiti, we have a sub-network of nine stations in the Caribbean (at the time of the Jan. 17 earthquake). There is literally not a seismometer in Haiti, so all the activity has to be monitored remotely," said AAPG member David Applegate, USGS senior science adviser for earthquakes and geologic hazards in Reston, Va., and formerly was director of the American Geological Institute's Government Affairs Program, working closely with AAPG on policy initiatives.

Monitoring earthquakes and gathering data make up a significant part of the USGS hazards mission, essential for issuing emergency notification.

APPLEGATE

> "We try to get the fastest information and the richest information out to the emergency responders as quickly as possible."

"We try to get the fastest information and the richest information out to the emergency responders as quickly as possible," Applegate noted.

"For the Haiti earthquake, we issued the magnitude 7.0 estimate within 20 minutes," he added. "We also were able to say at least two million people were exposed to violent shaking."

Haiti: In the Field

Geologists also are early responders following a destructive earthquake, but in a different sense.

Paul Mann, another AAPG member, is a senior research scientist for the Institute for Geophysics at the University of Texas at Austin. He and a fellow scientist traveled to Haiti after the January earthquake to conduct fieldwork.

"He and I are both involved in rapid response. I've just spent five days down there measuring the fault," Mann said.

"It was sort of like being in World War II. Everything was wrecked. All the buildings were blocks of concrete," he recalled.

Also, he said, people afraid to live indoors were staying outside everywhere – usually under makeshift tents made of bedspreads stretched across string.

Mike Jacobs, speaking as president of AAPG's Division of Environmental Geosciences, shared the concern.

"We as geologists, of course, are aware of the geological risks of living and working in certain regions and can make educated decisions on whether or not we choose to accept those risks," he said. "The tragedy with Haiti is that it is populated by some of the poorest people on this earth – and even if they were aware of the risk, they most likely had no choice on whether or not to accept it.

"Many paid the price with death and suffering," Jacobs said, "and my prayers and thoughts go out to them.

According to Mann, scientists need to react quickly to study indicators of recent earthquake activity, "ephemeral effects that are important but not permanent.

"It's a very good example of teamwork in trying to get down there while these indicators still exist," he said. "Some of those will disappear with the first heavy rainstorm."

Mann was able to travel to the epicenter fault area, detailing the near-site effects and discovering the ground had not ruptured from the quake.

"That's an important piece of information to have. It shows what happened to that fault during the earthquake," he said.

The Haiti quake involved an 80-kilometer section of the 600-kilometer Enriquillo-Plantain Garden Fault, which stretches from Jamaica to the Dominican Republic, Mann said.

Movement of the adjacent plates builds up fault stress very slowly, but inexorably. Earlier measurement and calculation had shown about two meters of stress built up on the fault, Mann noted.

"If you release two meters of stress on this fault you would get a 7.2 magnitude earthquake, so it was just a little smaller than we thought," he said.

Mann was frequently interviewed

See **Geohazards**, page 8

A day-to-day effect

Geomagnetic Activity Also a Risk

The U.S. Geological Survey monitors earthquakes, volcanoes, landslides and geomagnetism. Other agencies track hurricanes, tsunamis, floods, even icebergs.

Which has the greatest day-to-day effect on the oil and gas industry?

Most likely, geomagnetism.

It's not hard to think of big impacts from fluctuations in the Earth's magnetic field – causing voltage surges in power lines that can lead to blackouts, interrupting radio transmissions, degrading the effectiveness of GPS, damaging satellite electronics and so on.

Geomagnetism also affects national security operations, said Jeffrey Love, adviser for geomagnetic research for the USGS in Golden, Colo.

During magnetic storms, navigational systems can be affected and astronauts and airplane passengers can be subjected to enhanced levels of radiation. Not surprisingly, the U.S. Air Force is a BIG customer of the National Geomagnetism Program.

And "during large magnetic storms, it's not unusual for expensive satellites to be lost or damaged," Love said.

Oil and gas companies also draw on the USGS geomagnetism data.

"They oftentimes engage in directional drilling, with a small magnetometer in the instrument package that's lowered into the hole," he noted.

At high latitudes, a compass reading can vary as much as 10 to 20 degrees during a large geomagnetic event, Love said, so correcting for geomagnetism is more than a minor concern.

Pipeline operators also keep their eyes on the data because magnetic activity worsens pipeline corrosion.

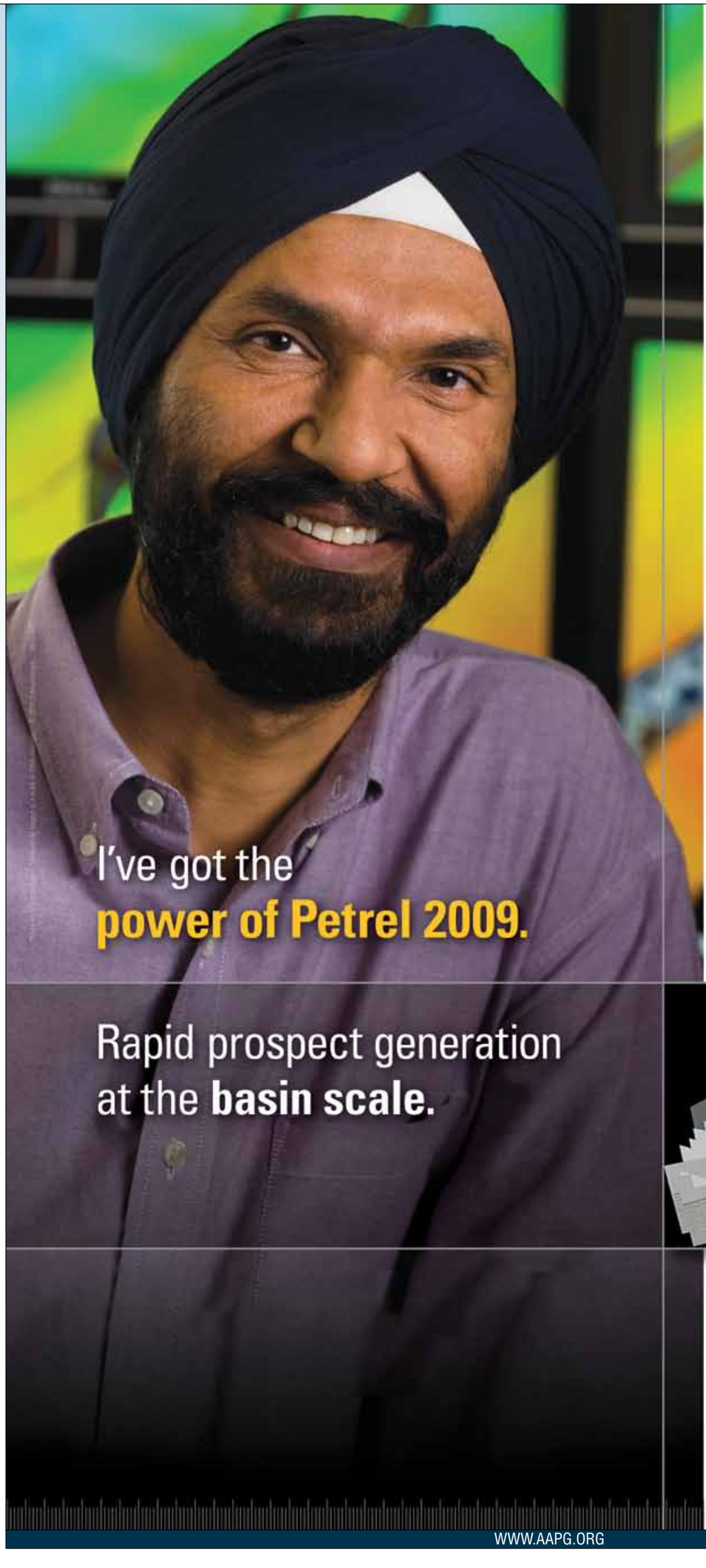
"What the pipeline industry does is put a current into their pipeline that offsets the current induced by the natural magnetic field variations," he said.

The USGS operates magnetic observatories to measure geomagnetism. Customers can get direct information feeds or monitor various program resources.

Data also is available through the International Real-Time Magnetic Observatory Network, known as the INTERMAGNET program, currently chaired by Love.

At the USGS, "we're now working with the industry up in Prudhoe (Alaska). We're installing a magnetic observatory to assist with directional drilling," he said.

– DAVID BROWN



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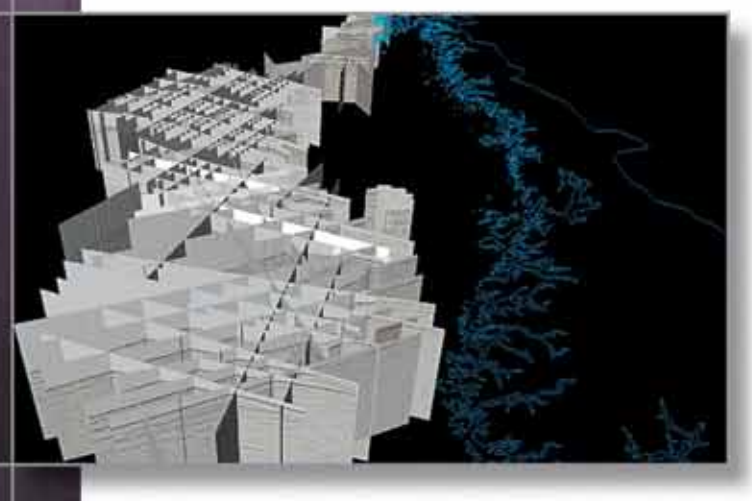

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Geohazards
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by national media after the quake as one of a small group of scientists who'd produced studies warning of the possibility of a major earthquake in Haiti.

"'Predicted' would be too strong a word, because they didn't say anything about when that earthquake might happen," Mann said.

"The real fear now," he added, "is that the movement of this 80-kilometer section has increased the stress on the adjacent parts of the fault."

'A Very Young Science'

Although earthquake science has made impressive advances, it has not reached the point of predicting the time of an event, or even narrowing down the possibility into a short timeframe.

"That has proven elusive," Applegate conceded.

"Instead, what we focus on are medium- and long-range forecasts," he said.

For the USGS, that means an assessment of a quake's likely intensity and probability in a 30-year to 50-year period.

As an example, Applegate cited a 2008 joint forecast by the USGS and other agencies that predicted a 99 percent likelihood in the following 30 years for a quake of 6.7 magnitude or greater in California, with the two most likely candiates for a major earthquake being the Hayward Fault in the San Francisco Bay area or the southern section of the San Andreas Fault.


PRENTICE

> "There are a lot of major cities located near active geologic faults. And as population grows in areas of activity, the risk grows."

"It's still a very young science. We seem to know more from every earthquake, but we still have a long way to go before we have a good handle on the predictability," said Carol Prentice, a paleoseismologist for the USGS Western Earthquake Hazards Team in Menlo Park.

"What you don't know is if an earthquake is going to happen now, or will the strain accumulate for another 100 years and it will be a bigger earthquake," she added.

Earthquake researchers focus on Late Holocene geology and events, conducting fieldwork for measurement of current and past activity. A major technique "is to cut trenches across faults to see where earthquakes have occurred," Prentice said.

They also conduct surface studies of fault areas, aided by remote sensing technology that can image through vegetation.

"The most exciting thing these days is LIDAR," she said. "It's a remote sensing device that actually looks through trees."

While some areas of the world are well-studied, Haiti is in an area not nearly as well understood seismically, Prentice noted.

"The studies that need to be done just haven't been done," she said. "We never got the funding to do it."

Long-Lasting Consequences

The USGS also conducts a Volcano Hazards Program, with a network of five major volcano observatories and other resources, and with additional research conducted at the Menlo Park Science Center.

"Unlike earthquakes, volcanoes have proven to be fairly predictable. We're in the process of developing a national volcano early warning system," Applegate said.

Beyond the immediate effects of a volcano eruption, the event can have longer-lasting and far-reaching consequences. For instance, "there have been several cases where aircraft have flown into a volcano ash cloud and lost engines, sometimes all four engines," he noted.

But earthquakes remain unpredictable, and right now scientists are studying the geological aftermath of the Haiti quake. Researchers often say the most likely place to expect earthquakes is where earthquakes have struck before.

"This quake is not the worst earthquake that could have happened. That's what is so stunning. This earthquake broke to the west, so the bulk of the seismic energy was directed away from the city," Applegate said.

"The fault has not done all that it's going to do. As rebuilding takes place, we can say with high certainty that structures need to be able to withstand at least the amount of shaking we saw in the last event," he added.

Earthquake risk is measured not only by the likelihood of an event, but also by the amount of destruction that might result.

"An important point to make is that there are a lot of major cities located near active geologic faults. And as population grows in areas of activity, the risk grows," Prentice observed.

That's one reason she thinks earthquake forecasts, even with limited certainty, are a valuable tool.

"If you hear there's a 68 percent chance of rain," she said, "you might bring an umbrella."

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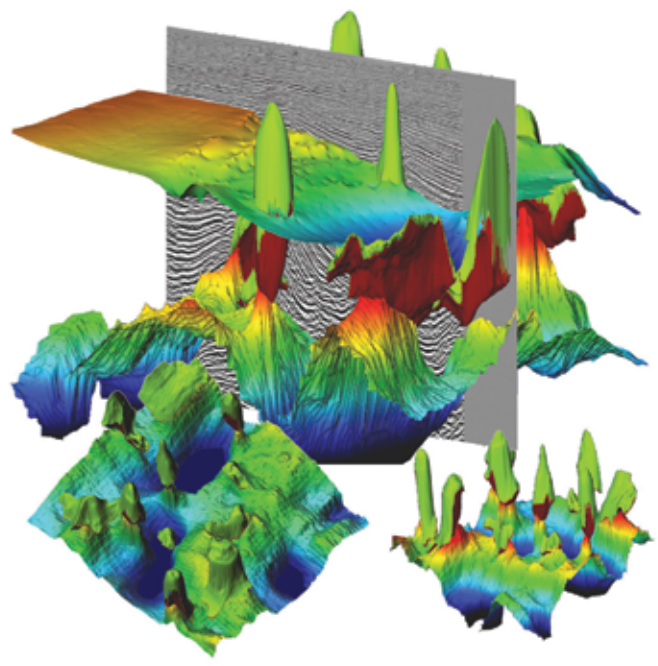

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Legalities, realities are high hurdles

Iraq Potential Faces a Lot of 'Ifs'

By LOUISE S. DURHAM, EXPLORER Correspondent

There are a number of folks who appear to suffer from modern-day Chicken Little syndrome – except rather than running about proclaiming the sky is falling, they're all aflutter that the world is running out of oil.

Perhaps so, but the global petroleum scene makes this prediction a hard sell to many.

New technology continues to provide access to previously inaccessible deposits, and big new finds aren't unusual. Look, for instance, at McMoRan Exploration's recent five-mile-deep discovery in the Gulf of Mexico that has the potential to open up a whole new play in the shallow water Gulf.

Then take a gander at the sizeable proven oil reserves – particularly in the Middle East, where Saudi Arabia reigns as the undisputed kingpin harboring about 260 billion barrels of black gold.

Iraq reportedly occupies second place on the giant reserves list, boasting 115 billion barrels, followed by Iran with 90 billion.

Iraq's petroleum deposits are concentrated principally in the northern and southern regions of the country. The bulk of oil production and exports originate in the southern province of Basra, while significant amounts come from fields in the northern region near the city of Kirkuk, according to AAPG member Louis Christian, a Dallas-based Middle East exploration consultant.

Oil seeping from the Pila Spi formation on the north limb of the Shaikan Anticline, Iraq.

Iraq essentially is one big oil pool waiting to be produced following years of turmoil in the country.

Christian emphasized that from a geological point of view, Iraq is far less intensely explored than Saudi Arabia, and perhaps Iran as well.

"Tens of kilometers or even 100 kilometers between wells and seismic lines in parts of Iraq west of the Euphrates River leave open, inadequately explored regions," he said, "where Iraqi gravity and magnetic modeling suggests undrilled structural trends and horst blocks with the potential for Mesozoic and Paleozoic closures, carbonate shelf edges and reef trends analogous in age and dimensions to the Paleozoic basins of West Texas."

Christian said Paleozoic prospectivity in Iraq depends largely on lower Silurian source rocks, where thermal maturity runs the gamut from cool and immature to mature – and on to sometimes over-mature, depending on current temperatures as well as past burial and re-uplift histories.

Just Getting Started

Look for the exploration action to rev up soon given the many companies just waiting for the chance to explore this oil-rich country, now that the political scene is beginning to stabilize somewhat and the government is putting out a welcome mat of sorts.

In fact, Halliburton CEO Dave Lesar is on record as saying he expects new drilling in Iraq to spark a "land rush," provided there's a peaceful Iraqi election in March as well as passage of an oil law by the nation's Parliament. Such a law would lead to a more inviting climate for foreign investment.

Considerable bickering and disagreements have stalled passage of a pending oil law, delaying an influx of the industry players standing on the sidelines eager to tap into the vast reserves. In the northern part of Iraq, Kurdistan stepped away from the fray early on and implemented its own law.

Attempts by the oil and service companies to secure contracts in the country may be a frustrating exercise, but the real challenges will come later.

Whether wanting to explore and develop or to provide services to existing fields, nothing will be easy in this region where years of warfare and lack of expertise both have taken their toll.

For instance, oilfield infrastructure has

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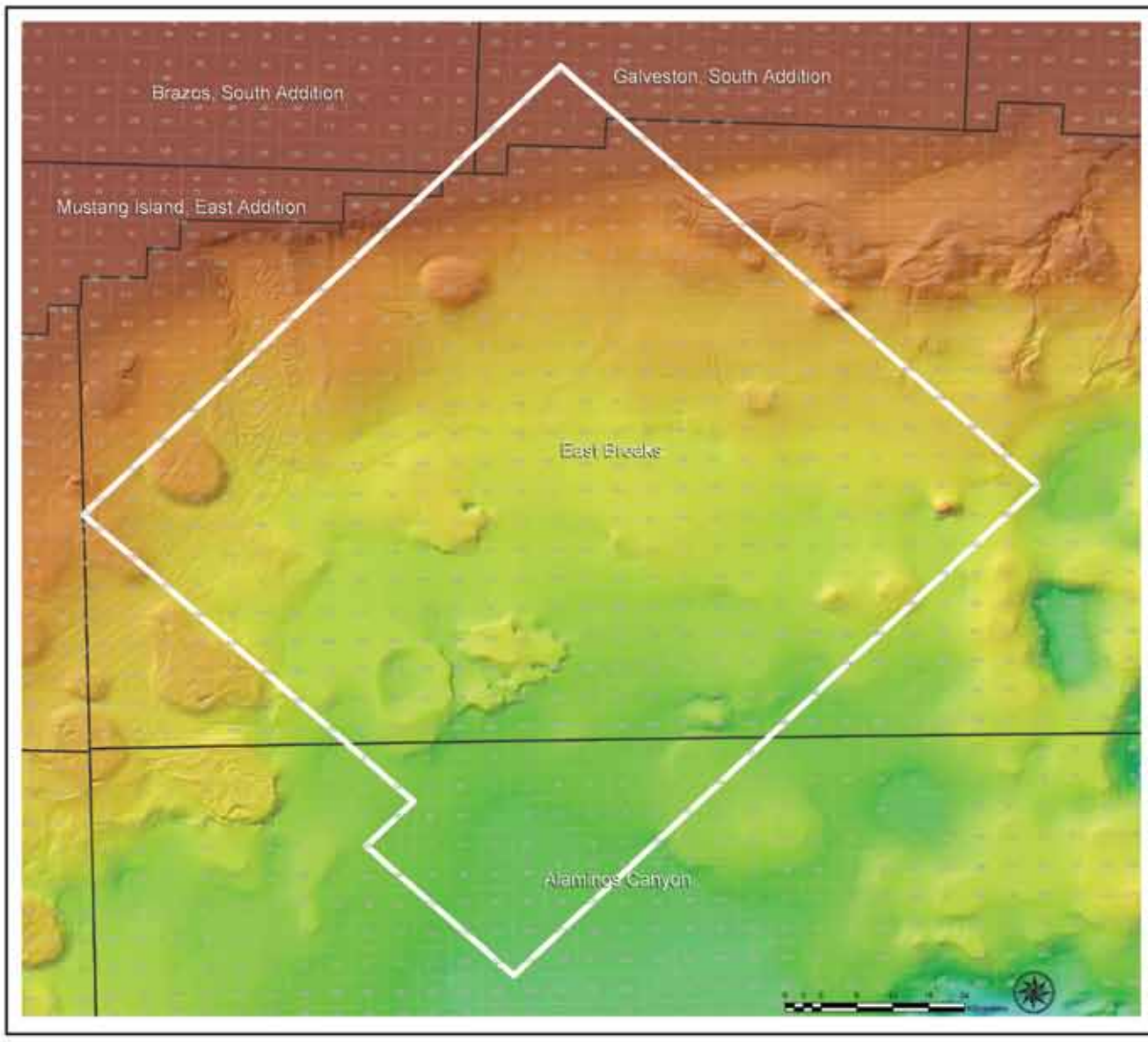

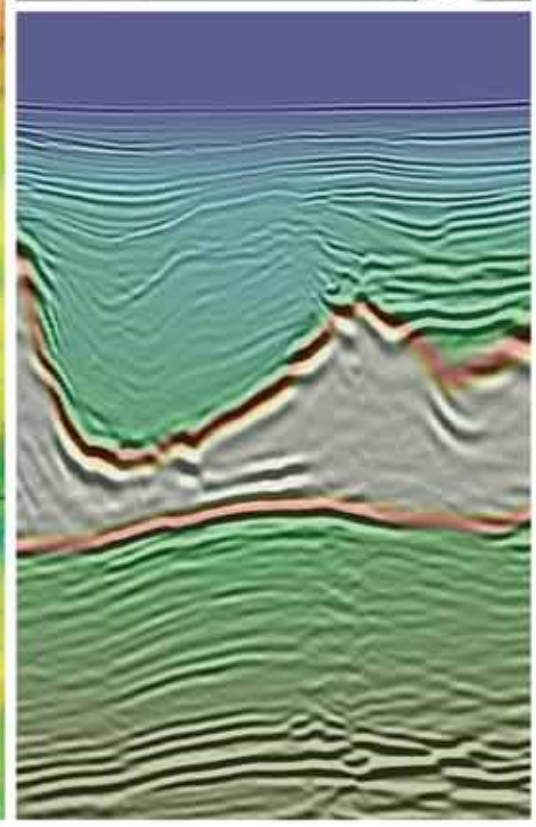

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Parasitic folds in the Pila Spi on the gently dipping south limb of the Shaikan Anticline.

Irag

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suffered dramatically from neglect and purposeful destruction, and many reservoirs reportedly have suffered damage due to lack of production know-how. Also, there's no guarantee that oilfield sabotage events are a thing of the past in this fragile country still plagued by terrorism, corruption and other problems.

Developing Story

Thus far, the Iraqi government has conducted two bid rounds that included some of its largest fields.

In the first round, BP and China National Petroleum Corp. received the only contract, which entails redeveloping the enormous 17-billion barrel Rumaila field in southern Iraq on the Kuwait border. The companies reportedly intend to spend $15 billion to jack up the production to 2.85 million bopd from the current one million bopd, catapulting Rumaila to second place in output worldwide behind the giant Ghawar Field in Saudi Arabia.

Other giant fields in southern Iraq already are designated to see some action.

These include West Qurna, which is said to hold 21 billion barrels.

In a joint venture, ExxonMobil and Royal Dutch Shell were awarded a contract to develop the nine billion barrel West Qurna-1 field. Statoil and Lukoil are reported to have partnered to ink a deal to develop the 12-plus billion-barrel West Qurna-2.

Not far away to the east, Shell and Petronas latched on to a contract to develop the 13 billion-barrel Majnoon field, where development has been hindered by its location on the Iranian border. Majnoon reportedly means "crazy" in Arabic, which was considered to be an appropriate moniker for a field holding such massive reserves in a relatively small geographic area.

Oil industry interest in southern Iraq clearly is intense, yet the productive Kurdistan region in the north has its share of the action, including the prolific Kirkuk field, which was originally discovered in 1927. The field may hold nine billion barrels of remaining reserves, but it has suffered considerable damage.

For example, waterflood projects had broken down in the past, and the field workers were re-injecting processed crude and residual oil back into the sands because there was no other place for it, according to AAPG member Harry "Bud" Holzman, geological consultant.

Independents' Day

Opportunities in Iraq aren't exclusively for the super-big players.

Look, for instance, at Gulf Keystone Petroleum Ltd., which is a Bermuda-registered independent oil and gas exploration company listed in London that focuses on exploration in the highly prospective and productive Kurdistan region in northern Iraq.

Gulf Keystone drilled the Shaikan1-B discovery well in 2009 in the Shaikan block near the city of Dohuk, about 85 kilometers northwest of Erbil. The block covers an area of 283 square kilometers.

The Shaikan structure in the Kurdistan province is an east-west anticline at the northwestern part of the Zagros/Taurus Foldbelt, according to AAPG member Joe Studlick, COO at Dynamic Global Advisors in Houston and a 2009 Robert H. Dott Award-winning co-author. The structure is on trend with several major discoveries, including Miran West, Kirkuk, Taq Taq and Tawke.

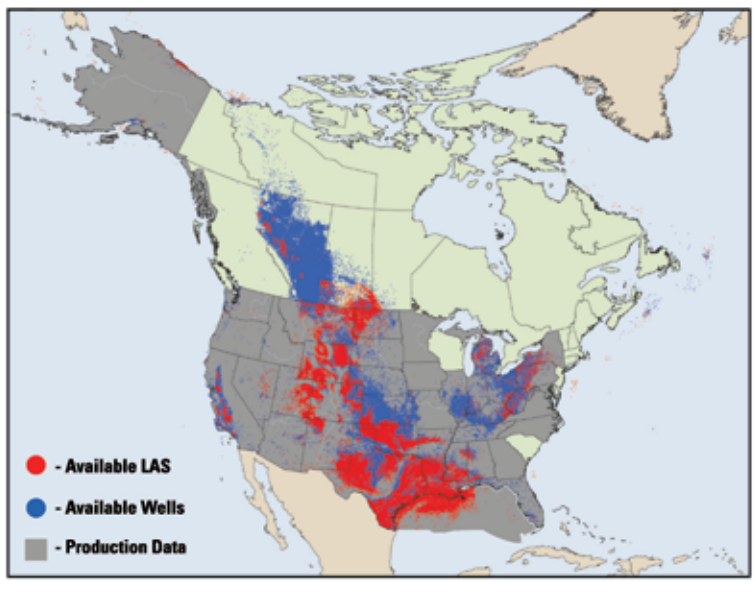
"The early Paleozoic history of this province was dominated by clastic deposition," Studlick said. "Silurian shale was deposited during this time and is a key source rock in the region.

"Carbonates dominate the reservoirs of the Mesozoic stable platform of the Zagros Foldbelt," he said, adding that "multiple potential source rock intervals – Triassic, Middle and Upper Jurassic, Lower and Middle Cretaceous – occur in this sequence."

The Shaikan1-B well reached TD at 2,950 meters measured depth and encountered nine hydrocarbon-bearing formations within Cretaceous, Jurassic and Triassic deposits. Drilling was halted several hundred meters above the planned TD because of an influx of high-pressure gas

See **Kurdistan**, page 20

Missing well data?



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Euan Macrae's seismic interpretation exercise will be offered at the Midland Valley booth (925) in the exhibits hall during the upcoming AAPG Annual Convention and Exhibition in New Orleans. The Virtual Seismic Atlas also has a booth, 1558. Clare Bond's paper, "When There Isn't a Right Answer – Dealing With the Uncertainty of Seismic Interpretation to Maximize Success," will be presented at 2:20 p.m. on Monday, April 12.

Its beauty lies in the eye of the beholder

Interpretation Skills Hone With Experience

By DAVID BROWN, EXPLORER Correspondent

It's a small miracle that someone can look at a set of seismic lines, then produce an interpretation related to real-world geology.

And it's no surprise at all that some of those interpretations are wildly wrong.

At AAPG's upcoming Annual Convention and Exhibition in New Orleans, geoscientist Clare Bond will discuss the interpretation of seismic data, what builds confidence for interpreters – and what one technique produces the best results.

Bond, structural geologist for Midland Valley Exploration Ltd. in Glasgow, Scotland, will present "When There Isn't a Right Answer – Dealing With the Uncertainty of Seismic Interpretation to Maximize Success."

She and her colleagues have studied how geoscientists approach seismic information to develop geological models.

In particular, they were interested in the failed or inaccurate interpretation with a poor match to naturally evolved geology.

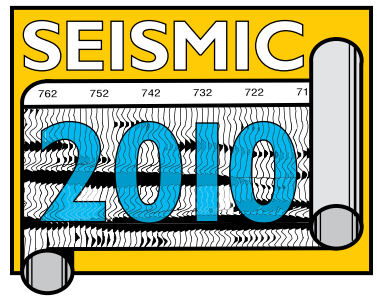
"You can kind of look at it with an expert eye and say, 'That doesn't work.' We were interested in why people create cross-sections that don't make any sense," she said.

Geoscientists aren't alone in struggling with incomplete information or flailing about because of unknown variables.

Bond cited a landmark paper by Nobel Prize laureate Daniel Kahneman and his frequent collaborator Amos Tversky, "Judgment Under Uncertainty: Heuristics and Biases," published in the journal *Science* in 1974.


BOND

> "We were interested in why people create cross-sections that don't make any sense."



"It basically looked at how awful human beings are in making decisions when there is uncertainty," she noted, "or at least risking."

The Bearing of Bias

As part of this project, Bond gave a synthetic seismic section to various participants and asked for their interpretations. Participants in her studies have been drawn about 50-50 from industry and academia, and have ranged from university undergraduates to professionals with more than 15 years of experience, she said.

Out of 412 interpretations:

- Only 21 percent of the participants identified the correct tectonic setting of the original model.
- Only 23 percent were able to highlight the three main faults in the seismic image.
- Only 10 percent of the interpretations showed the correct inversion model for the section.

That experiment quantified the range of conceptual uncertainty for the seismic set and helped identify factors that influence how knowledge and concepts are applied to seismic interpretation.

By examining the results, Bond and her colleagues were able to classify distinct interpretational techniques, to determine what approaches worked best and to study how experience, bias and area of expertise affected the interpretation process.

Bond noted that one challenge for an interpreter is honoring the seismic data while devising a geometrically possible model – an interpretation relevant to and consistent with real-world geology.

"There's always this interplay going on," she said.

Bias can have a negative or positive effect. For instance, if an interpreter is biased toward a model involving basin subsidence and subsidence is a factor in the correct interpretation, the chance for a right answer increases.

But bias, area of expertise and prior experiences can lock an interpreter into a wrong or unhelpful approach.

Workflow Strategies

To minimize that risk, Bond has suggested workflow strategies that broaden the range of concepts available to geoscientists as they interpret seismic data, followed by strategies to refine the models produced.

Specifically, her suggestions for interpretation include:

- Using one or more geoscientists with a range of prior knowledge.
- Exposing geoscientists to multiple concepts prior to interpretation.
- Removing regional and tectonic context.
- Encouraging multiple interpretations.

For assessing concepts and refining and risking models, she suggested:

- Using structural evolution and restoration techniques to determine model viability.

See **Interpretation**, page 20

Kurdistan
from page 14

while drilling the borehole.

Studlick noted that seismic data show prospective deeper closures that will be tested by further drilling in 2010.

A 3-D seismic program over the Shaikan structure also is planned for 2010.

Gulf Keystone contracted DGA while the well was still drilling, to evaluate the resources discovered by the Shaikan1-B well, which was a kind of feather-in-the-cap event.

"It's a rare opportunity in one's career to be able to evaluate a world class discovery," Studlick emphasized. "I believe Shaikan was in the top five discoveries in 2009."

DGA estimated the oil resources between 1.9 BBO and 7.4 BBO with a mean value of 4.2 BBO. Gas resources range from 0.4 Tcf to 1.5 Tcf with a mean value of 0.8 Tcf. High side resources are estimated at approximately 13 BBO and 2.7 Tcf. There was no free water level encountered in the well through TD.

The Shaikan discovery not only demonstrates a significant resource but significantly reduces the geologic risk in Gulf Keystone's adjacent opportunities: the Sheikh Adi, Akri Bijeel and the Ber Bahr blocks, which are on trend with the Shaikan structure. The discovery proves the presence of hydrocarbon source and migration in the area.

The pleasant work experience in Kurdistan was an added bonus.

"Working in Kurdistan for the last two years has been a pleasure," said AAPG member Chris Garrett, vice president of operations at Gulf Keystone.

"The scenery and geology are exceptional, and the Kurds are welcoming," he said, "and the Kurdish government is helpful, proactive and positive.

"Gulf Keystone as an operator has been encouraged to move forward with a minimal amount of bureaucracy," Garrett noted. "This, combined with the spectacular Shaikan prospect, has allowed us to quickly drill the Shaikan1-B discovery well."

Holzman expressed confidence that if Iraq gets its act together with a good hydrocarbon law and brings in the service companies to repair the infrastructure, there's no reason why the country couldn't overtake any place in the world in production. The veteran geologist emphasized the country is the size of Texas with about 2,300 wells drilled.

"They have the oil, and they just need to get it out," he said. "It's easy to get to, and the exploration costs are extremely low."

Interpretation
from page 18

- Considering regional and tectonic context.
- Use of peer review and specialist technical assurance.
- Assessment of play impact.

Examples from the interpretation exercises can be found online in the Virtual Seismic Atlas (VSA) at www.seismicatlas.org.

VSA describes itself as an "open access community resource to share the geological interpretation of seismic data," with high-resolution images that can be freely downloaded and explored.

Overseen jointly by the University of Aberdeen and the University of Leeds, the VSA project is supported by the Natural Environment Research Council, the Geological Society of London, the Petroleum Exploration Society of Great Britain and a number of energy companies.

Take Your Best Shot

Bond's presentation at the New Orleans meeting will examine interpretation of seismic data sets by geoscientists at various career-stages. Her co-authors are Zoe Shipton, Euan Macrae and Chris Philo, all from the department of geographical and earth sciences at the University of Glasgow.

By studying the evolution of approaches to seismic interpretation along with the interpreters' level of experience and expertise, Bond and her colleagues have been able to identify key skills and technical workflows.

That enabled the development of new training strategies, with the goal of helping geoscientists optimize their interpretational ability, at any career stage.

The overall study compared two experiments. In the first, geoscientists were asked to interpret a seismic section without any information about geological setting, stratigraphy or other context. In the second, participants were given a seismic section with five possible interpretations and asked to choose the best one, or to make their own.

Comparing those exercises provided information about how geoscientists evolve skills to deal with interpretational uncertainty and how their approaches change when similar problems are framed differently.

Macrae will follow that paper with the presentation "Uncertainty Analysis of Geological Interpretations," with Bond and Shipton as co-authors.

His presentation will describe a statistical investigation of the factors that contribute to conceptual uncertainty in interpretation, called the Freyja Project.

"The original project was called Odin – we gave them the names of gods from Norse mythology," Bond explained.

A questionnaire and seismic image will be handed out to members of the audience for the presentation, so everyone who wants to can participate in the project, she said.

What builds confidence for seismic interpreters?

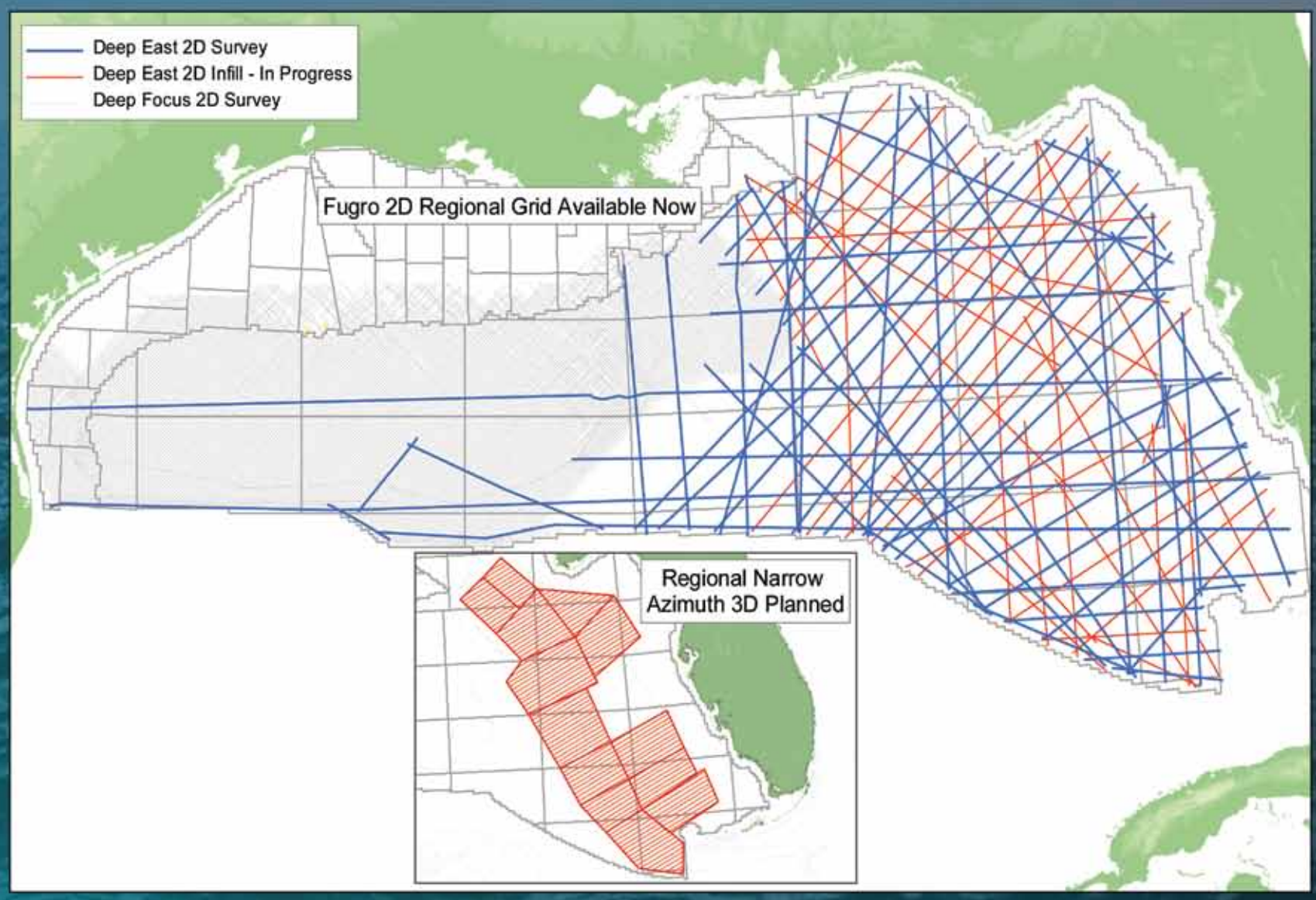
The key is experience, Bond observed.

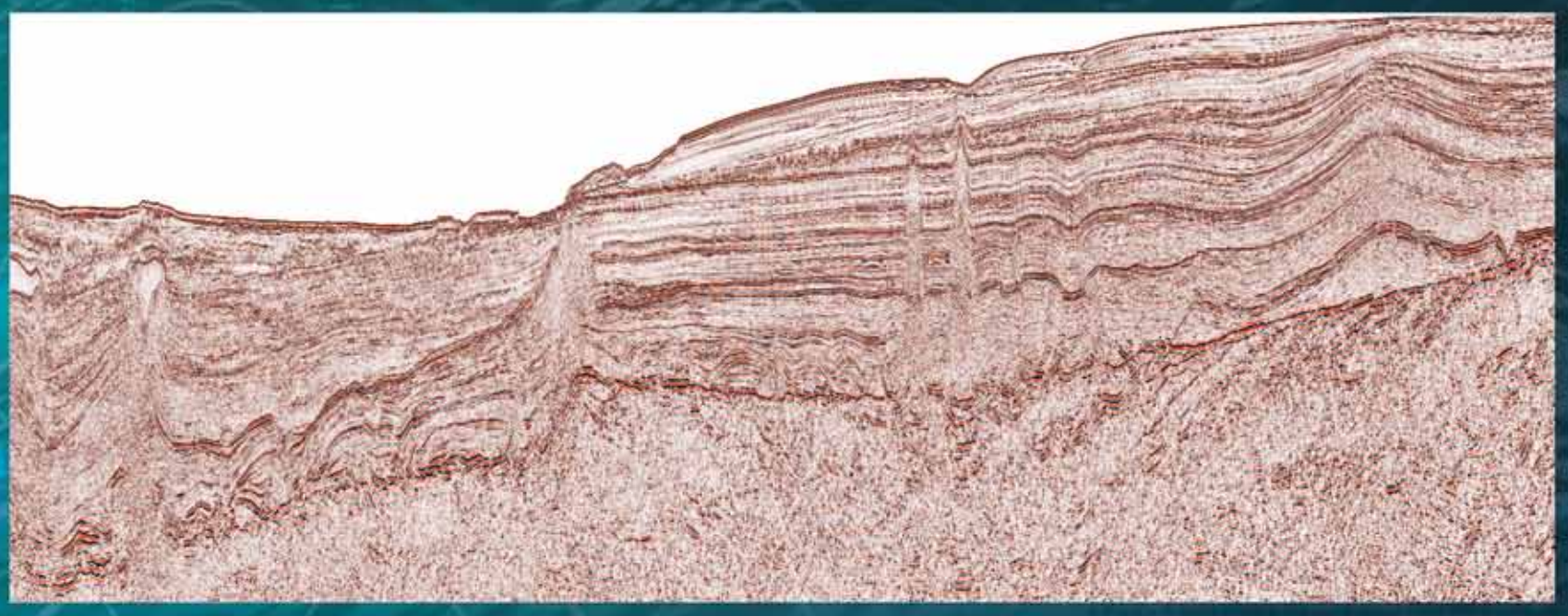
Right or wrong, geoscientists with more experience were more willing to identify and label features like fault lines in a seismic section.

And what one, specific approach produces the most accurate seismic interpretations?

Bond will discuss that finding, and others, during the April 12 afternoon session, "Seismic Interpretation of Faulted Reservoirs: How to Get the Right Answer the First Time."

Florida Infill Underway...





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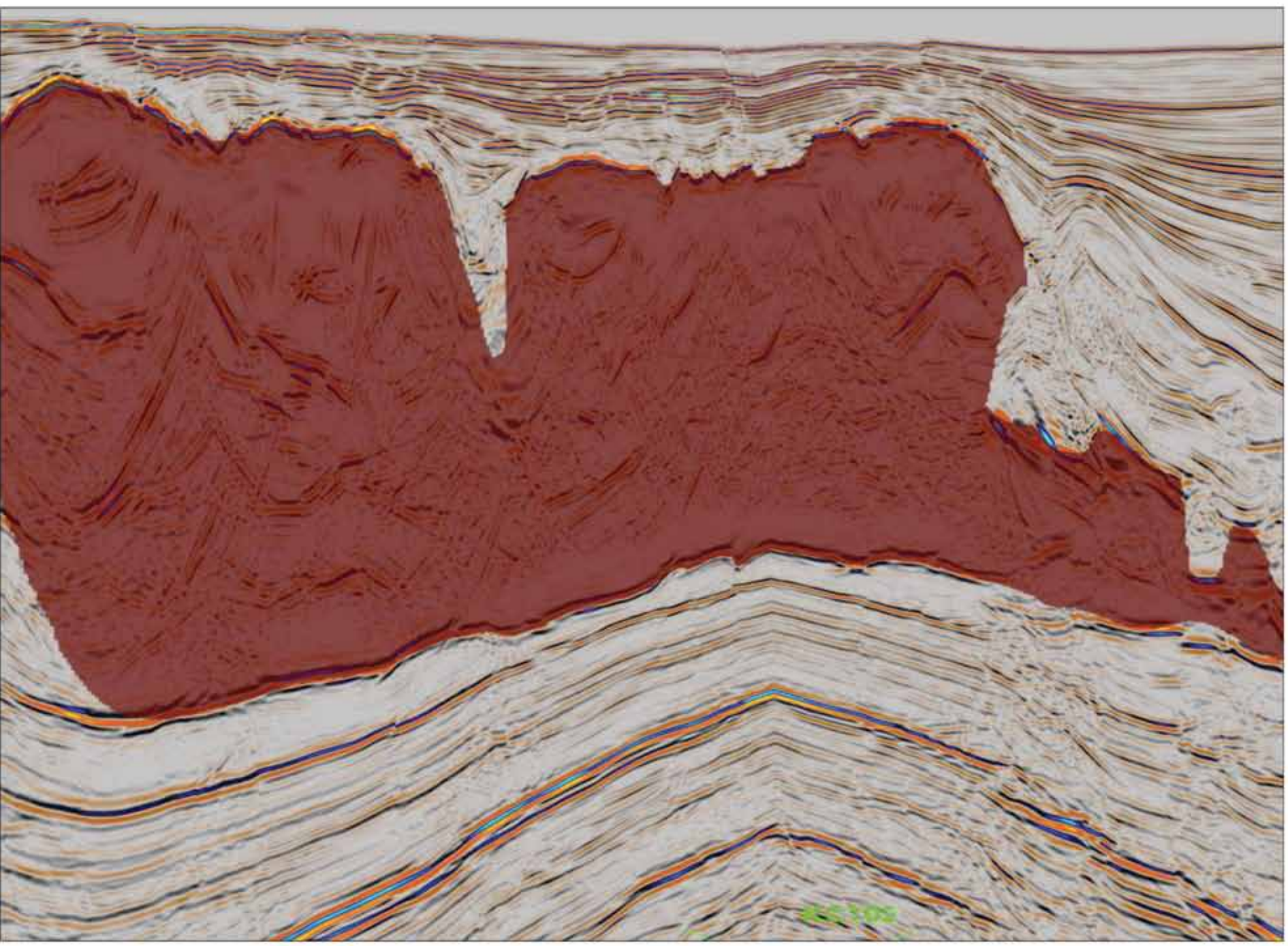


'Kaleidoscope' gives seismic a different perspective

Play This: Game Chip Aids Exploration

By LOUISE S. DURHAM, EXPLORER Correspondent

Few folks would think video games have anything in common with seismic imaging.

Yet a gaming chip is at the heart of Repsol YPF's new proprietary technology designed to elevate seismic imaging to a whole new level of refinement.

In fact, the chip providing the punch to accomplish this just happens to be the same one used in the Sony PlayStation 3 game consoles.

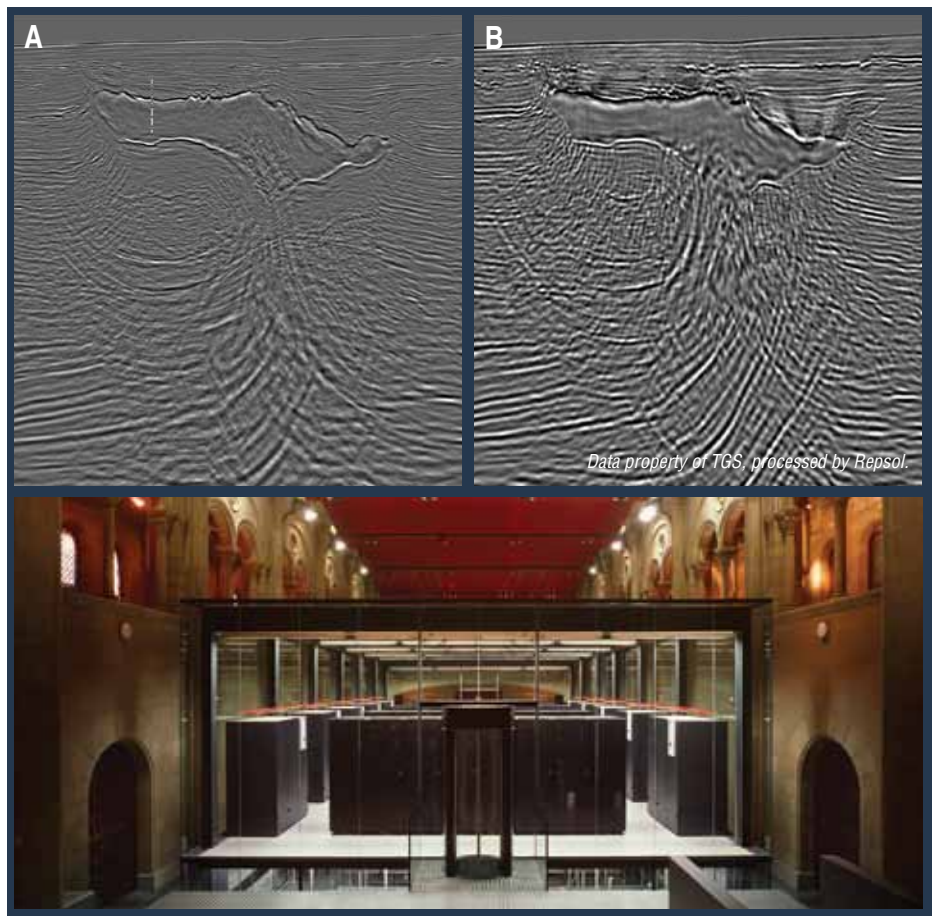
The multi-cell processor is powering the next generation of high performance computers needed to handle the new seismic imaging algorithms required to succeed in the highly competitive business of subsalt exploration, particularly in the deepwater Gulf of Mexico with its ever growing volumes of seismic data.

Officially dubbed Kaleidoscope, the Repsol project dedicated to developing this innovative technology had the benefit of input from a consortium comprised of representatives from industry, academia and non-industry business entity IBM.

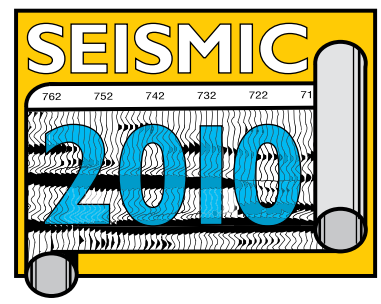
"The idea for Kaleidoscope is to look at the same seismic data available to all companies, but completely from a new perspective," said Francisco Ortigosa, director of geophysics at Repsol YPF.

To get there, the company veered off the usual path.

"Traditionally in industry, research is made on the algorithms with the thought that someone will provide the hardware needed," Ortigosa said. "We decided we would grab the bull by the horns and develop the hardware platform at the same time as developing the algorithms – and this approach proved very successful."



The glass-encased MareNostrum supercomputer and (above) a seismic data comparison from the Gulf of Mexico showing a salt body resembling a pillow-like structure. Section A has been processed using Wave Equation Migration (WEM); section B is the same section, but processed with Reverse Time Migration (RTM).



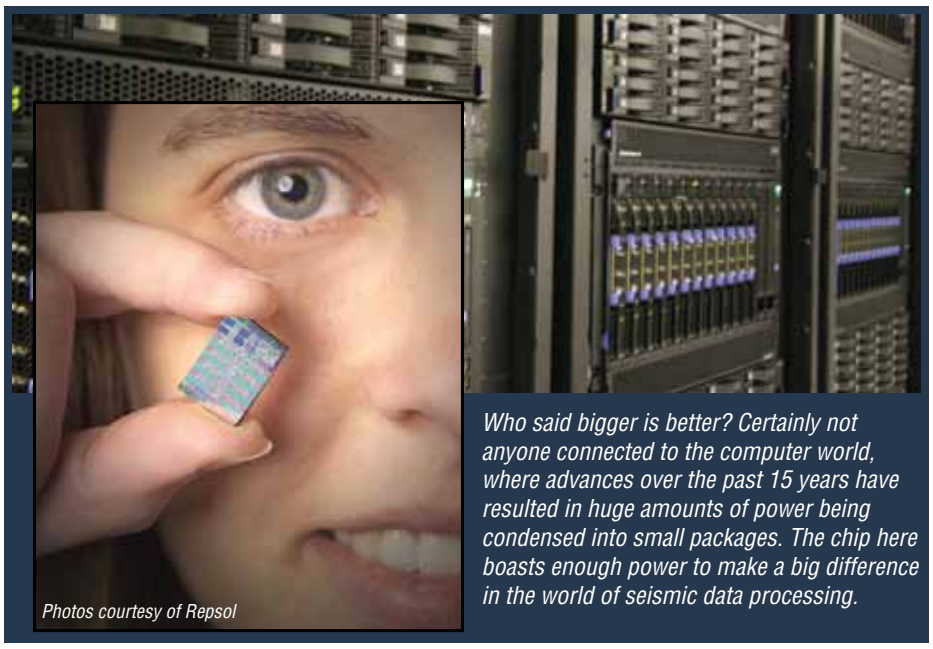
Quality Control

It was determined four specific characteristics were essential to the processor:

- Multi-core element (multiple processing cores on a chip).
- Based in commodity off-the-shelf markets in order to be sufficiently economical to flourish and be applied extensively.
- Low power consumption.
- Manufacturer's hands-on support.

Ortigosa noted that after evaluating different platforms, they realized that

See **Game Tech**, page 26



Photos courtesy of Repsol

Who said bigger is better? Certainly not anyone connected to the computer world, where advances over the past 15 years have resulted in huge amounts of power being condensed into small packages. The chip here boasts enough power to make a big difference in the world of seismic data processing.

Game Tech

from page 24

the cell processor developed by Sony, IBM and Toshiba that's used in the PlayStation 3 and other consumer electronics fulfilled those four requirements.

ORTIGOSA

He noted also that the chip is basically designed for real time response.

The decision to use the chip led to assembly of a powerful, physically small supercomputer containing 600 of the processors and packing a mega punch equivalent to 10,000 PCs.

"IBM manufactured the chips and tailored the supercomputer to our requirements and completely tailored it for the kind of algorithms we're running," Ortigosa said. "This computer is unique in its own species."

Repsol has been using this advanced tool successfully for the past two years to process seismic data from subsalt environments in the Gulf of Mexico and offshore Brazil. The turnaround is exceptionally fast, but the data can be processed very quickly without any tradeoff of quality, according to Ortigosa.

"Kaleidoscope is able to ensure the maximum possible imaging quality regardless of the computer power required," he said. "The economic value of Kaleidoscope is that it gives better images leading to better decisions.

Something's Coming

Even so, the current technology is only one component of what's to come.

Repsol kicked off its Phoenix project at the end of 2009, taking what they already have developed one order of magnitude faster and one better.

Kaleidoscope and Phoenix provide yet another example where the industry presses on to devise the technologies needed to continue exploring efficiently and economically in an array of challenging circumstances.

"It's very interesting that every time we change the old plays, we have the talent to find new geophysical tools to image these (new) plays," Ortigosa said.

This is no small feat given that the computing power to find oil in the deepwater subsalt Gulf of Mexico is three orders of magnitude higher than the computing power needed in the 1980s and 1990s on the shallow water shelf.

"In the Gulf in the '80s, pre-stack time migration was good enough for shallow water shelf exploration," Ortigosa said. "Then we went deeper, working with the salt flanks, and the standard algorithm used was the Kirchhoff equation.

"Moving even deeper and below the salt, where Kirchhoff couldn't see, we had to develop wave equation migration," he said. "This was only possible because of PC Linux clusters.

"Now because of changing geological plays, we had to develop reverse time migration, or RTM," he noted. "But RTM requires computing power an order of magnitude higher than wave migration.

"It's easy to see how computing power and imaging algorithms align in the Gulf of Mexico," Ortigosa added.

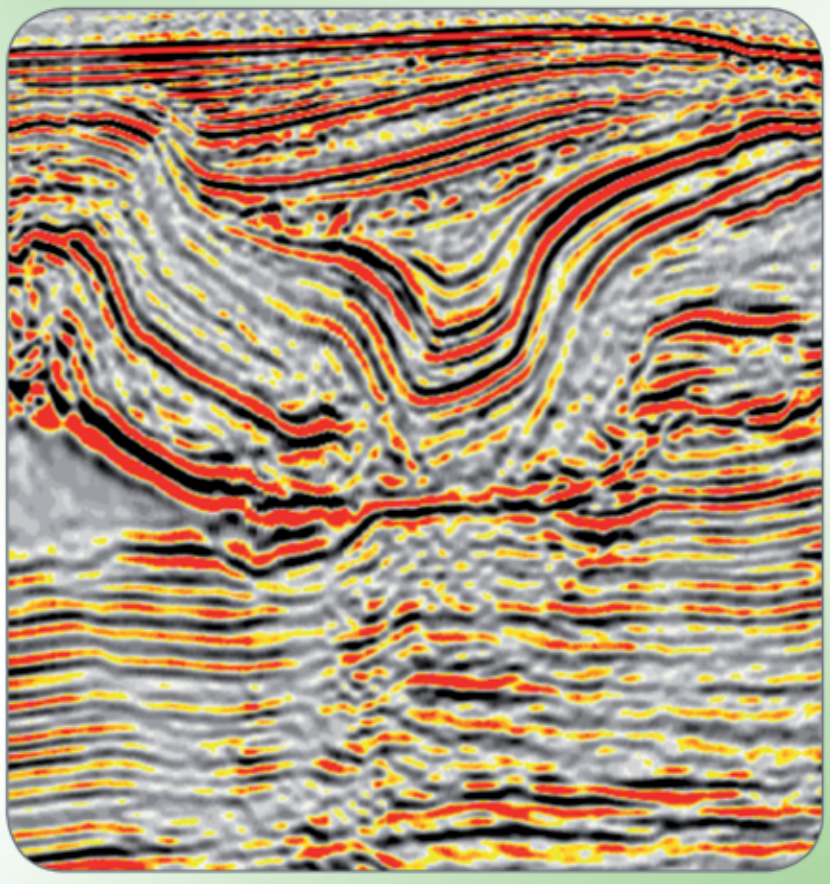
"New plays are coming, and for these we don't have the computer power," he said. "That's why Phoenix is coming to fill this gap.

"In the Gulf of Mexico now, it makes sense to invest in this kind of technology or research," he noted, "because a 10 percent to 15 percent increase in the probability of success with technology makes it economic."

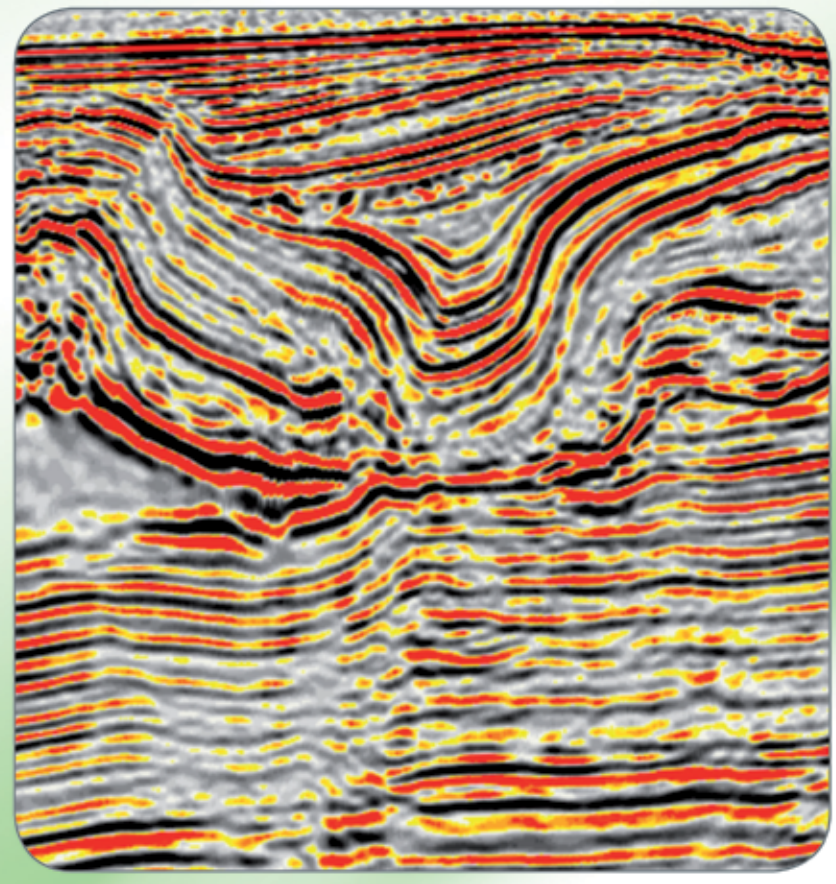
Repsol, an integrated Spanish oil and gas company, has received considerable recognition for the technology coming out of the Kaleidoscope project.

The IEEE granted it an award for one of the five most innovative projects worldwide in 2008. Another of several awards came in December 2009 when the company received the Platt Energy Award for commercial technology of the year.

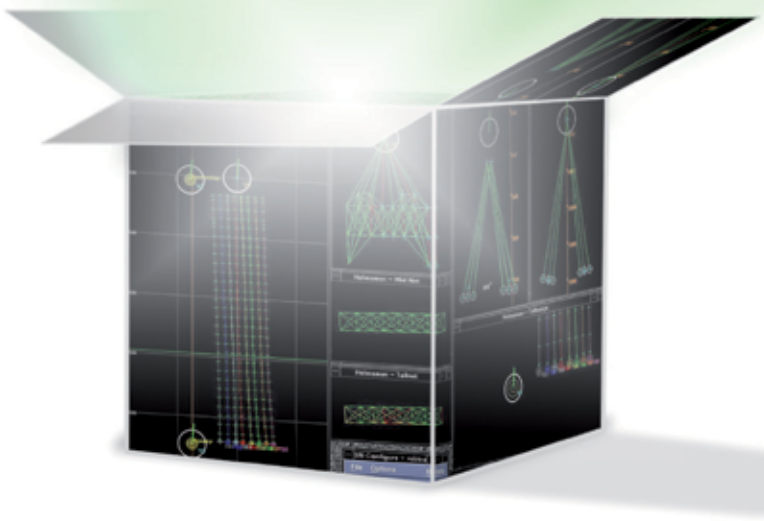
The Power of **Creativity**



Isotropic RTM from the Walker Ridge WAZ multi-client survey, Gulf of Mexico



TTI-RTM from the Walker Ridge WAZ multi-client survey, Gulf of Mexico



TTI-RTM WIDE-AZIMUTH IMAGING

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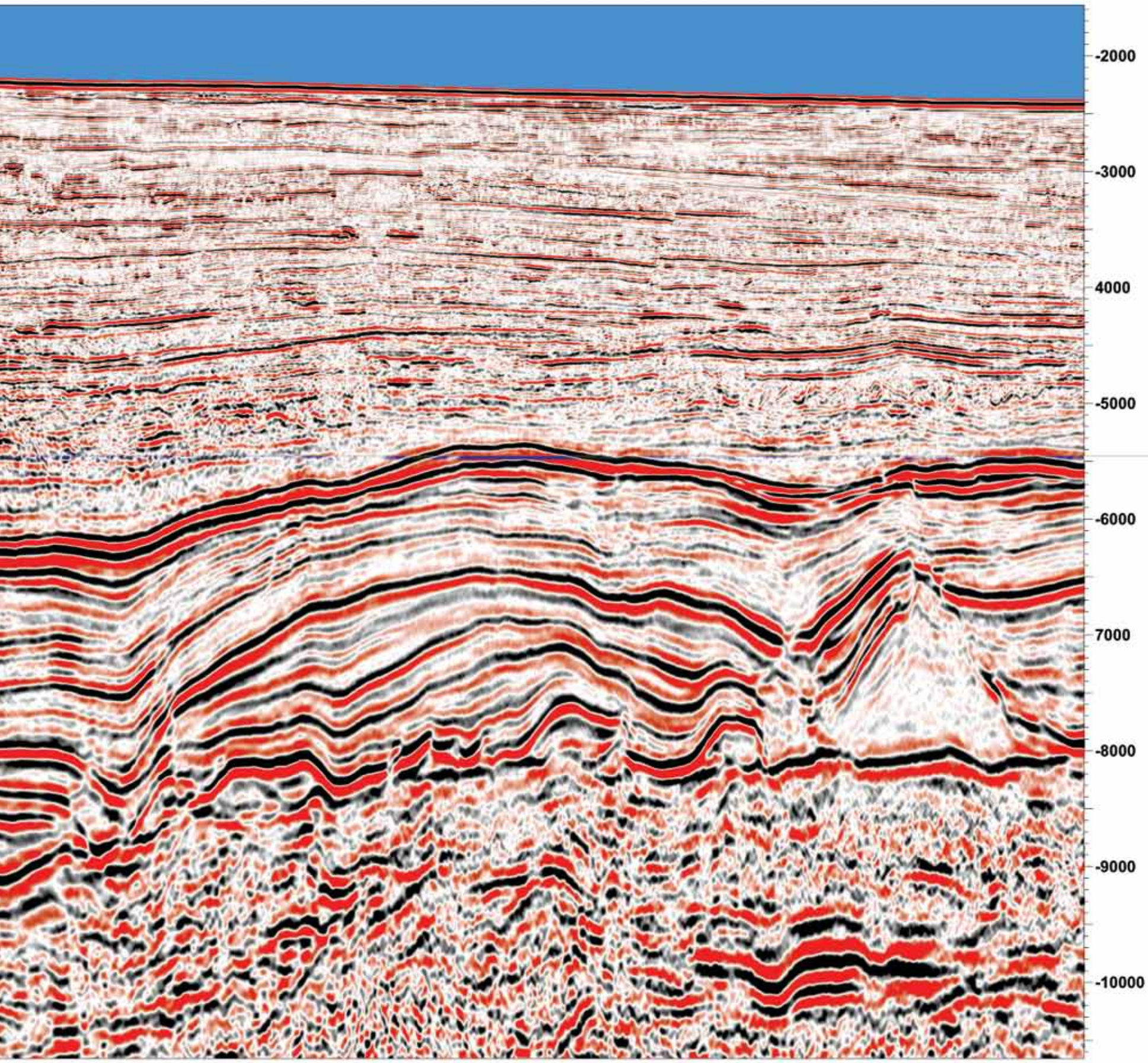

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Do you speak 'seismic?'

'Conversation' Without Velocity

By LOUISE S. DURHAM, EXPLORER Correspondent

Seismic data processing technology has progressed markedly over the past decade or so.

In fact, the research folks sometimes come up with a new technology that doesn't just push the envelope, it appears to blast all the way through.

"Talking seismic data" no doubt fall into this category.

Using new seismic methods, the processor or interpreter decides on the topic for the data to "talk" about and then instructs them to talk to one another, staying focused on a specific seismic processing goal until the data conversation delivers the specific processing objective.

This is no joke.

In fact, this technology already has resulted in forms of coherent noise removal (for example, removing free surface and internal multiply reflected events) that require no subsurface information and are now widely used within the petroleum industry.

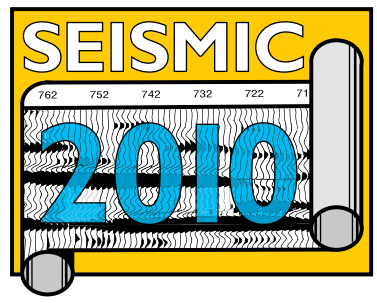
They are particularly effective in complex geologic situations, such as subsalt plays in the Gulf of Mexico, offshore Brazil and the Red Sea.

The thrust now is to extend that earlier noise removal capability to the extraction of useful subsurface information from signal.

Researchers have developed and are preparing to field test a new imaging method that enables seismic events arriving at the recorder to "converse" with each other to reveal a raft of critical information beneath the earth's surface.


WEGLEIN

> "We set up a math-physics conversation where we get them to talk together, thereby getting data to cooperate and participate in reaching seismic processing goals."



Included among the goals are depth imaging, target delineation and Q compensation – each using a distinct data conversation that focuses on one of these goals.

The added kicker is this can be accomplished without any firsthand knowledge of the earth and can be achieved directly and without any indirect expression of a need for subsurface information through a proxy – velocity and other subsurface data are unnecessary.

This near-mystical-sounding development stems from the Mission-Oriented Seismic Research Program (M-OSRP) established in 2001 at the University of Houston (UH). The program is supported by more than a dozen major oil and industry service companies.

The M-OSRP functions under the leadership of its founder, Arthur Weglein, who is the Hugh Roy and Lillie Cranz Cullen Distinguished Professor of Physics at UH.

The research effort is complex, but the goal is defined succinctly: "We want to make the currently inaccessible petroleum target accessible," Weglein said, "and the accessible target better defined."

Coming and Going

When a seismic source sends a signal into the earth during the data acquisition phase, it continues traveling until it hits an interface, when a part of it is reflected back to the seismic recorder. The larger the contrast in properties at the interface, the larger the amplitude or size of the reflection. The time of the arrival reveals how long the round trip required.

"We classify events by whether they go straight down and back up, which we call a primary," Weglein said, "or if a wave bounced around a bit and then comes back up we call it a multiply-reflected event, or a multiple.

"You want to get rid of multiples because they hit too many reflectors, and you can't decipher and isolate the encoded information within the multiply-reflected event's complicated history," Weglein noted. "We've become known for getting rid of the multiples – without knowing anything about the earth."

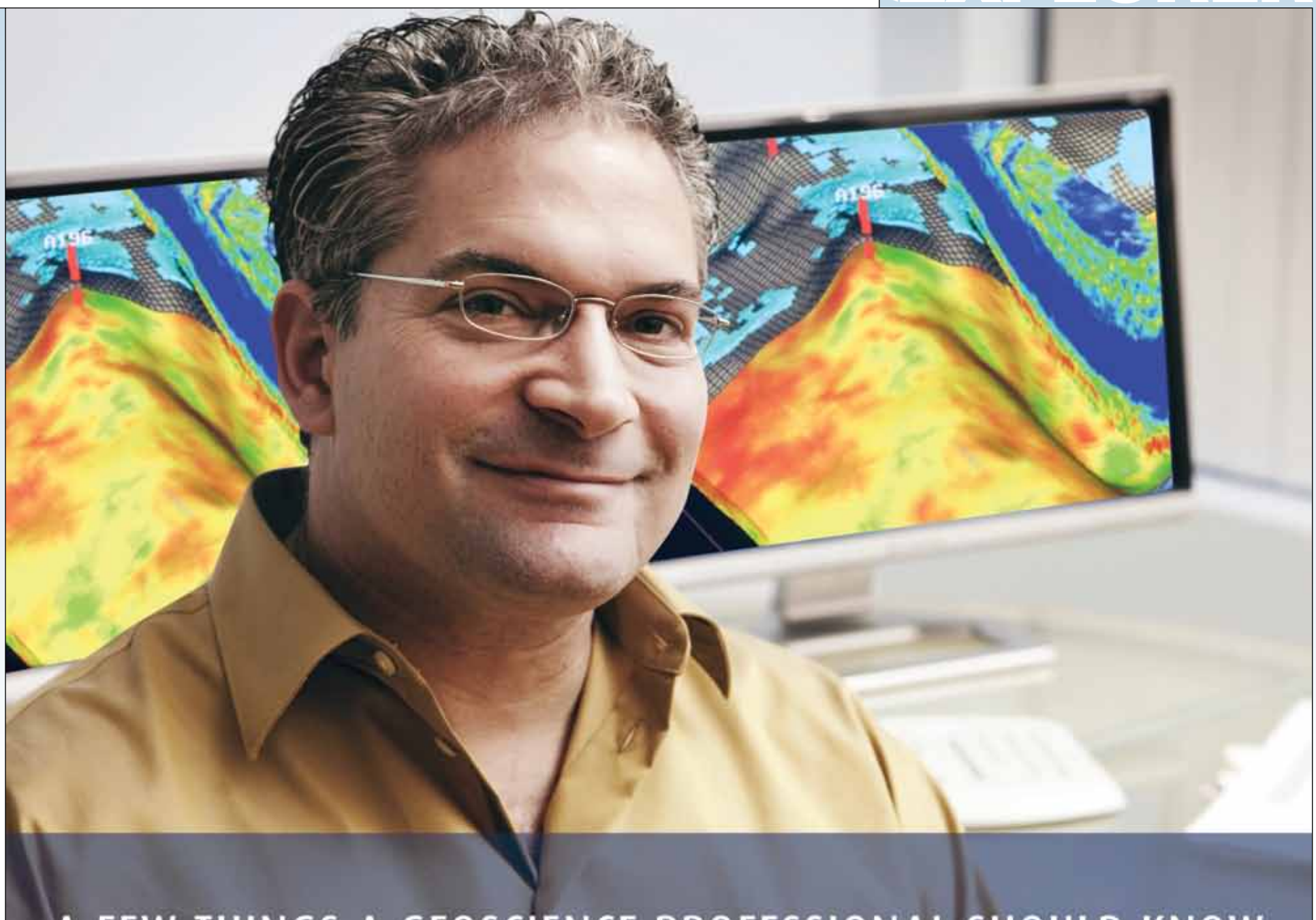
Here's the blueprint.

Historically, the only way to know if the signal went down and straight back, or whether it has bounced around and hit multiple reflectors prior to returning is to know the earth, particularly to be able to determine velocity of the signal as it traversed the subsurface.

"If we mathematically make events talk to each other in a math-physics sense, we set up a math-physics conversation where we get them to talk together, thereby getting data to cooperate and participate in reaching seismic processing goals," Weglein said. "Without that cooperation all seismic processing methods – for example, for multiple removal or depth imaging – require subsurface information to reach the same end.

"By getting events to cooperate and communicate with each other with a certain

See **Chat Room**, page 32



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Chat Room
from page 30

conversation, they tell us which events are down and back, i.e., primaries, and which are multiples – without our knowing the earth," he said.

"The inverse scattering series, or ISS, is a math-physics program we've developed that allows that kind of communication between events for different seismic purposes," Weglein continued. "The ISS has the unique ability to achieve all processing goals directly and in precisely the same manner that free surface multiples are removed, i.e., without subsurface information.

"The methods we originally developed 20 years ago for removing multiples were highly controversial and radical when we first introduced them, due to their claim of not needing any subsurface information," Weglein continued. "However, our earlier (so-called) radical ideas for removing all multiples have now become fully mainstream and are in widespread industry use worldwide.

"Now we are focused on primaries and target information extraction," he said, "and we now claim we can directly determine the depth of the target without any need for a velocity model – that's the current controversial and radical thought."

Complex Challenges

Ordinarily, when working with an individual primary event, the questions become:

- How deep in the earth did the down-going wave encounter a reflector?
- What did it experience at that depth?
- Is what resides at the reflector something that interests the petroleum industry?

In a simple homogeneous geologic setting where the wave velocity may be known to be, say, 60 mph, and the wave makes a round trip into the subsurface and back in one hour, determining the depth of the reflector to be 30 miles is a slam-dunk.

Venture out to the deepwater Gulf of Mexico and such simplicity disappears.

"The problem with current imaging in the deepwater Gulf of Mexico underneath the salt in the subsalt environment is we can't often enough and accurately enough figure out the velocity above the target, because the salt is very complex," Weglein said. "They can't get that 60 mph, so to speak.

"If I have a top salt primary, or bounce, and a primary from bottom salt and the subsalt target primary and I know the velocity experienced to reach each of these, then I could figure the depth," Weglein said. "But all too often I can't because it's a very complicated problem.

"We have a roughly 90 percent failure rate in the deepwater Gulf of Mexico drilling, with 25 percent not even reaching the target," Weglein said. "At $150 million per exploration well, and the pressure to develop fields with fewer wells, this confluence of technical difficulty, drilling hazards and costs is a pressing challenge for the petroleum industry.

"If we were more effective in determining velocity and acquiring images under salt we would have a higher percent success in drilling," he said.

Well, you say, maybe people just need more data and more computer speed.

Won't work.

"Collecting more data and acquiring faster computers is important and useful, but they do not recognize a key underlying problem behind drilling dry holes – and hence, by themselves, do not represent a comprehensive solution and response," he said.

"What's missing and what's wrong is what we call a breakdown or violation of algorithmic assumptions, violations not caused by limited data or computers," Weglein noted. "Because the current ability to find velocity fails under complex geology, we've been looking for a method to find depth without needing velocity, aiming to locate and delineate target reservoirs without having to know anything above it."

Up to Speed

To overcome a problem in determining velocity, Weglein cited two approaches:

- Find a new, improved way to find the velocity, and then you can use current imaging methods that depend on having an accurate velocity model. However, there's no candidate method or concept today with that improved velocity promise or potential.
- Find a totally new imaging method that doesn't need velocity either directly or indirectly, which is what the M-OSRP is doing.

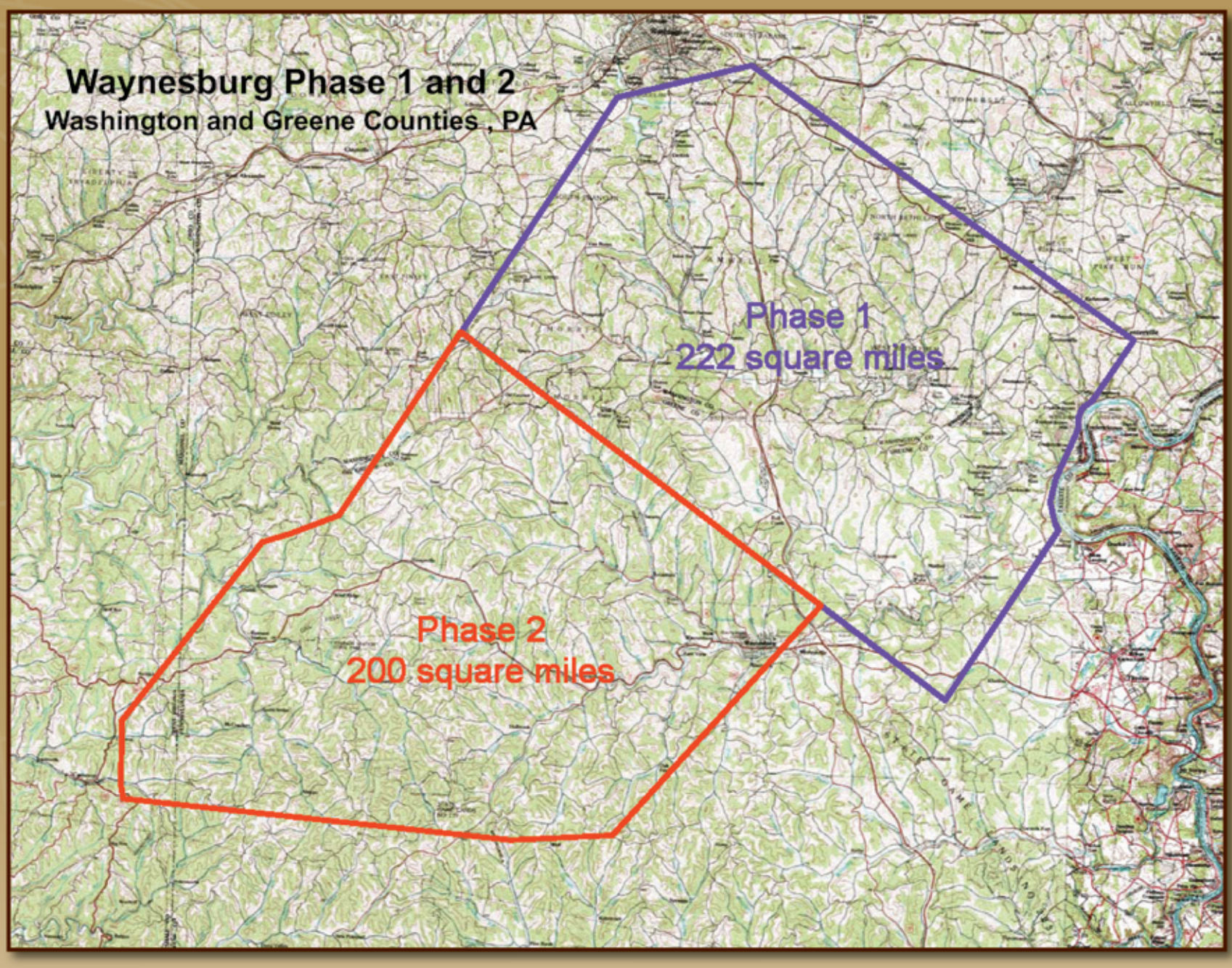
"These primaries at the top of the salt, bottom of salt and subsalt target have to have a conversation – a math-physics conversation," Weglein emphasized. "There's a certain math-physics communication that occurs that ISS allows that will output the depth without the velocity.

"If you allow all those primaries, or single bounces, from top salt, base salt and subsalt target to communicate with each other, then they will locate where each of their reflectors are," Weglein said, "without needing in principle or practice to know velocity or anything about the earth – we're after this game-changing new imaging capability to make currently inaccessible targets accessible."

He emphasized that this new target location and imaging capability applies to complex geology other than subsalt and to shallow water environments as well as deep. Additionally, it applies to onshore challenges for removing internal multiples and depth imaging.

The first field test of the ISS imaging theory is scheduled within a year, and likely will occur in the deepwater Gulf of Mexico. Actually, this will be a sequence of tests, of increasing levels of difficulty, which will kick off by addressing an imaging challenge, e.g., a fault shadow zone, and then moving forward in stages to the more difficult challenges, enabling the M-OSRP team to build its imaging experience on field data.

"The M-OSRP program clearly indicates that the petroleum industry will support fundamental high impact, potentially game-changing research," Weglein said, "if you can describe to the petroleum sponsors what benefits would derive, and be delivered, if we are successful – and in terms that make sense to them."



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The Geophysical Corner is a regular column in the EXPLORER, edited by Bob A. Hardage, senior research scientist at the Bureau of Economic Geology, the University of Texas at Austin. This month's column deals with "making seismic data come alive with shaded relief."

Shining Light on a Shady Situation

By ARTHUR E. BARNES

Seismic reflection data come alive when displayed with shaded relief. With shaded relief, time slices look like illuminated topography, and vertical sections look like rugged canyon walls; faults, domes, anticlines, synclines, channels and even gas clouds stand out boldly.

Shaded relief displays are ubiquitous in geology and geophysics. Elevations, bathymetry, gravity, magnetic and other kinds of map data are routinely displayed with shaded relief to make maps that look like photographs of apparent topography.

Such maps are powerful aids to geologic intuition because apparent topography often suggests true underlying geology.

Though contour maps offer the same information, shaded relief maps present the information in a way that is more natural – and so more readily comprehensible.

* * *


BARNES

Adding shaded relief to 3-D seismic data is similar to adding shaded relief to maps, with the difference that shading is applied to all reflection surfaces in the seismic volume, not to a single horizon. Thus seismic shaded relief is inherently 3-D, so that both time slices and vertical sections appear illuminated.

The process of adding shaded relief to seismic data is simple: create a shaded relief seismic attribute and blend it with the seismic data (figure 1). A shaded relief seismic attribute quantifies the amount of light that seismic surfaces reflect when illuminated by a distant light source (figure 2).

This quantity – the shading – is a function of the angle of incidence of the illumination, which depends on reflection orientation and the position of the sun. Shading can be controlled by exaggerating reflection slopes to enhance contrasts, or by adjusting surfaces to appear dull like shale, shiny-like water or moderately shiny-like quartz sand.

Because shaded relief depends on the sun position, it acts as a directional filter. Features that trend perpendicular to the illumination direction are highlighted, while features that trend parallel are hidden.

To capture all trends, it is necessary to create two shaded relief attribute volumes using orthogonal illumination directions.

Blending seismic data with shaded relief complements blending data with a discontinuity attribute because shaded relief reveals different structural features than continuity, principally anticlines, synclines and domes (figure 3).

Like discontinuity, shaded relief also reveals faults and channels (figure 4), with the advantage that it can indicate the direction of throw on a fault and show the internal geometry of the channel.

A shaded relief seismic attribute can have arbitrary resolution, but it tends to provide better results when it is fairly smooth and clean (as in the data examples presented here). Smoothed shaded relief highlights large features and trends that might otherwise be obscured by details in the data; it lets one see the forest for the trees. In this way shaded relief can serve as a useful tool for rapid reconnaissance of structure in a seismic volume.

Of course, smoothing reduces the resolution of the shaded relief so that small features, such as narrow channels and minor faults, will not be seen. These features are often best imaged by discontinuity and curvature attributes.

* * *

Almost everything we do to prepare seismic data for conventional interpretation is designed to make images that look as much like geology – and as little like seismic waves – as we can. Seismic shaded relief is another small step in this direction.

Can shaded relief aid our understanding of seismic data as much as it aids our understanding of geologic maps?

Only time will tell.

(Editor's note: Barnes, an AAPG member, is with Landmark Graphics Corp., Highlands Ranch, Colo. He can be contacted at Arthur.Barnes@halliburton.com.)

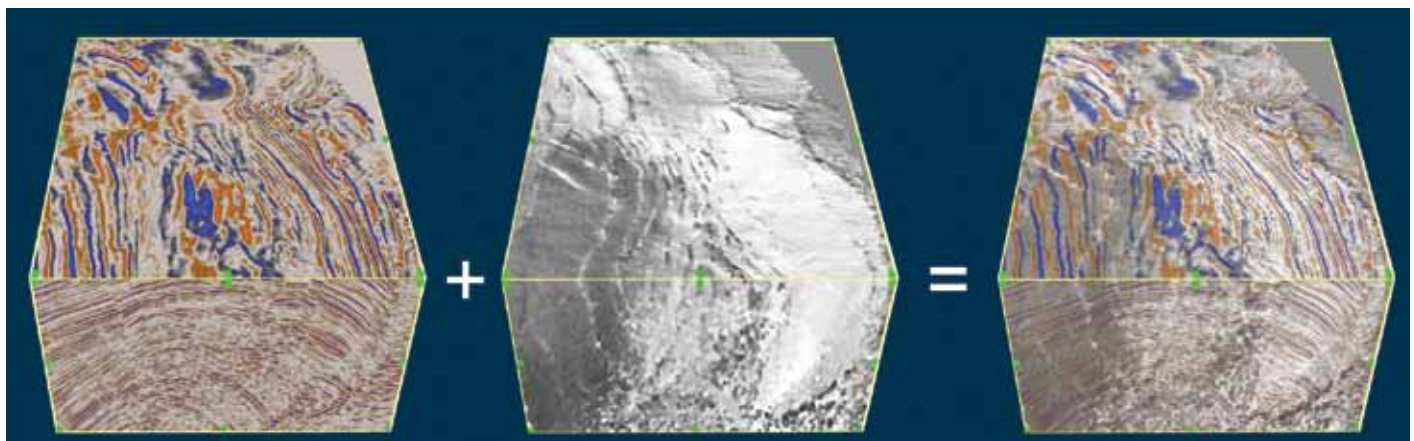
Figure 1 – Seismic data + shaded relief attribute = illuminated seismic reflections.

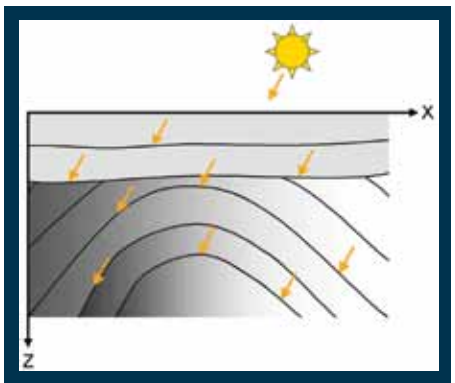

Figure 2 – A cross-section as it would appear if imaged by seismic data and converted to seismic shaded relief. At any point on a reflection surface, the illumination is a function of the angle of incidence of the light upon the surface.

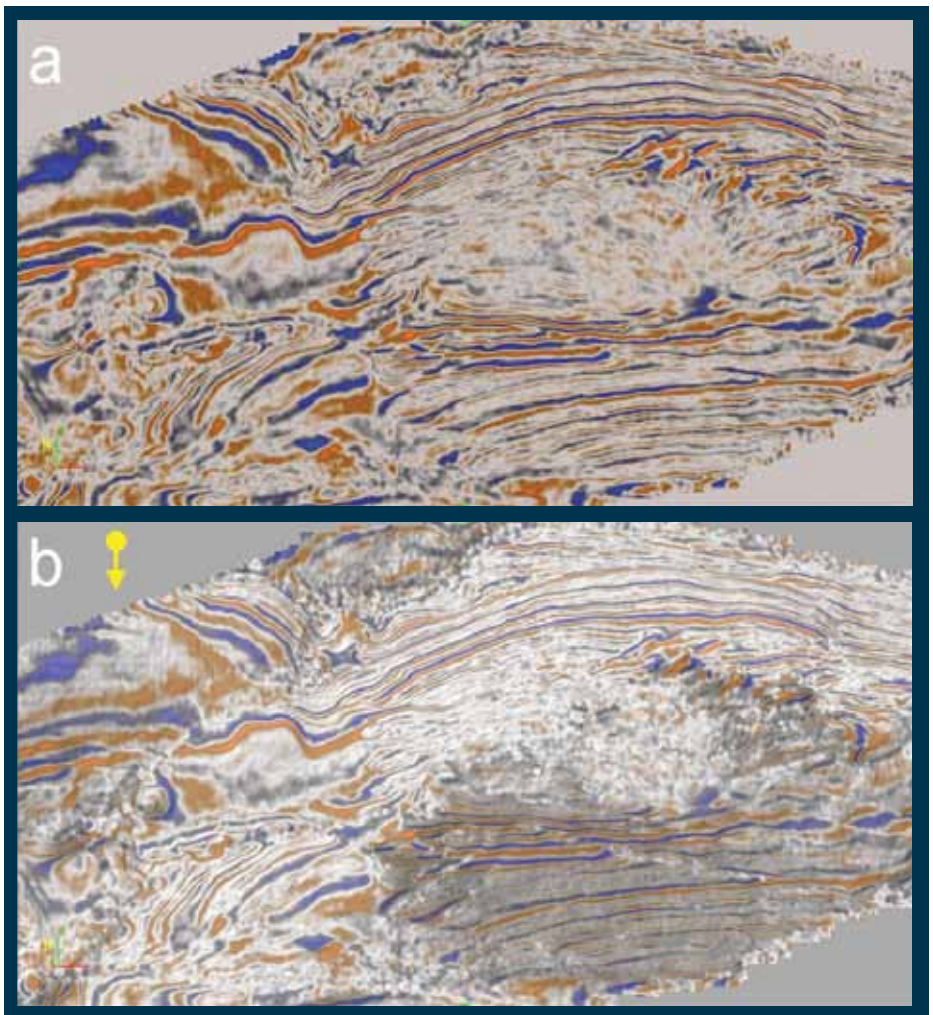

Figure 3 – (a) Time slice through the seismic data volume of figure 1; (b) the same time slice blended with shaded relief. The yellow arrow indicates the direction of illumination. The anticlinal structure stands out sharply, even though the crest is obscured by a gas cloud.

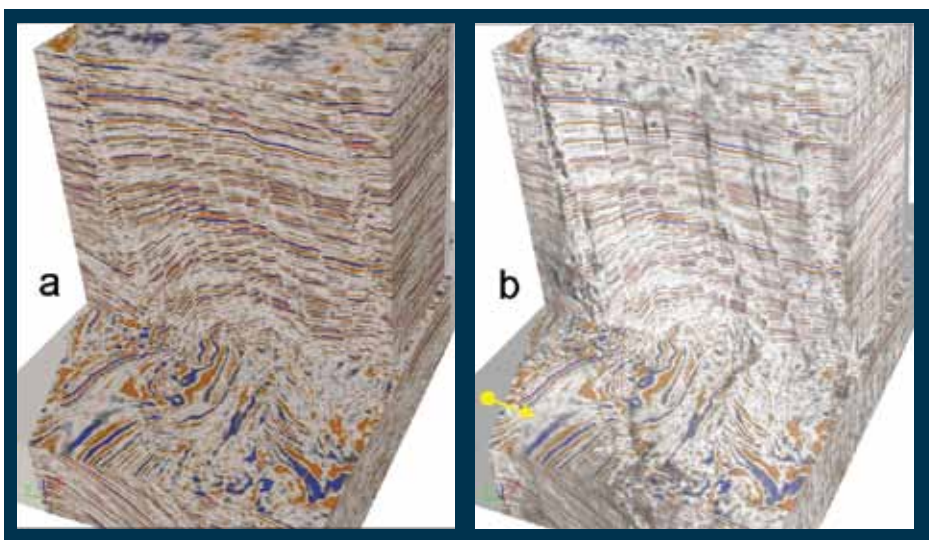

Figure 4 – Seismic shaded relief is best viewed along time slices or horizons, but it can also be effective in vertical view. (a) A highly faulted zone through the seismic data of figure 1; (b) the seismic data blended with shaded relief. The yellow arrow indicates the direction of illumination. Faults appear sculpted into the side of the volume and tend to be clearer.

Editor's note: David Curtiss, head of AAPG's Geoscience and Energy Office in Washington, D.C., can be contacted at dcurtiss@aapg.org; or by telephone at 1-202-684-8225.

WASHINGTONWATCH

Oil, Gas Take Hits on Proposed Budget

By DAVID CURTISS, GEO-DC Director

On Feb. 1 President Obama launched the federal appropriations season with the release of the fiscal year 2011 budget, outlining his priorities for the coming federal fiscal year (Oct. 1, 2010 to Sept. 30, 2011).

The budget hit the headlines with eye-popping deficit projections at 11 percent of GDP in FY2011. And more dramatically, wrote the *New York Times*, "By President Obama's own optimistic projections, American deficits will not return to what are widely considered sustainable levels over the next 10 years," and turn higher at the end of the decade.

To prevent a larger deficit this year and in its projections for the decade, the president proposed numerous measures to raise additional revenue and trim government spending. Oil and natural gas activities were targets on both sides of the federal income statement.

* * *

On the revenue side, the president has proposed to repeal a series of oil and natural gas tax "preferences." This is essentially the same proposal the president made last year, but which Congress did not adopt. The Office of Management and Budget estimated that eliminating these tax measures would net $36.5 billion over 10 years.

The measures include repealing for oil and natural gas companies the expensing of intangible drilling costs, percentage depletion for oil and natural gas wells, the exception of passive loss limits for working interests on oil and natural gas wells, a domestic manufacturing tax deduction available to all other industries and extending the amortization of geological and geophysical expenses for independents to seven years.


CURTISS

> Now is not the time for panic. Now is the time for AAPG members to get personally engaged.

It also repeals several other provisions: the enhanced oil recovery and marginal well credits, and a deduction for tertiary injectants.

If implemented, these measures would severely disrupt the petroleum industry, both majors and independent oil and natural gas producers. AAPG's view on taxes is articulated in its statement on tax reform:

" … AAPG supports [tax] policies which serve to encourage petroleum exploration and production …"

The president's proposals certainly do not meet this standard, and run counter to a sound national energy policy.

Continued on next page

Members Needed for This Year's CVD

By DEBORAH SACREY

Charles D. Warner, a friend of Mark Twain, is credited with the famous line, "Everyone complains about the weather, but no one does anything about it."

I don't know about you, but I have the same feeling about policy and politics – and no more so than right now, when lawmakers are focused on a host of issues that affect petroleum explorers and producers, ranging from hydraulic fracturing and energy policy to taxes and access to public lands.

That is why I invite you to join fellow AAPG members in Washington, D.C., May 10-12 for the second annual AAPG Congressional Visits Day (CVD). You will receive a comprehensive legislative briefing, and have an opportunity to meet with policy-makers and their staff to discuss issues of concern to AAPG members.

I strongly encourage you to attend if you would like personal exposure to the policy making process. We are looking for folks from industry, the consulting world and academia to join us.

Please note that AAPG does not provide funding for members to participate at AAPG CVD, but Divisions and Sections should consider sponsoring one of their members to ensure representation.

Contact David Curtiss (1-202-684-8225 or dcurtiss@aapg.org) to reserve your spot. I hope to see you in Washington in May.

(Editor's note: Deborah Sacrey is the chair of the DPA Governmental Affairs Committee.)

Continued from previous page

* * *

Turning to the expense side of the federal income statement, the president's budget proposed $200 billion in spending cuts to discretionary programs. These cuts were spread across federal agencies.

▸ At the Department of Energy (DOE) the proposed cuts included the oil and natural gas research and development (R&D) programs. In doing so, President Obama followed in the footsteps of President Bush, who also repeatedly "zeroed out" these programs.

The petroleum-oil technologies R&D program was unfunded in FY2010. Instead of restoring funding for this program, as it had in previous years, Congress reprogrammed $20 million for a new unconventional fossil energy technologies program.

The administration is not seeking FY2011 funding for either of these programs.

The natural gas technologies R&D program also was eliminated for FY2011. Funding in FY2010 was $17.8 million. Most of this was dedicated to methane hydrates research, which will shift to DOE's Office of Science.

Carbon sequestration research at DOE focuses on carbon capture technologies and geologic storage. The FY2011 funding request is down about 7 percent to $143 million. The regional sequestration partnerships continue their Phase III projects, with nine injection sites looking to inject at least one million tons of carbon dioxide over three years.

The DOE geothermal program continues to see increased funding requests. The FY2011 budget request is $55 million, an increase of 25 percent. The focus of this program is research, development and deployment of technologies to realize the potential of enhanced or engineered geothermal systems to contribute significantly to base load power generation in the United States. The program will continue its efforts in deploying a public geothermal database, international cooperation, low-temperature geothermal systems research – including produced water from oil and natural gas wells – and the challenges of induced seismicity and water usage.

▸ Shifting to the U.S. Geological Survey (USGS), its budget proposal included a 9 percent increase for the Energy Resources program, to $30.8 million. This increase is to provide the scientific support the Department of Interior needs to foster wind development on public lands.

▸ The Minerals Resources program faces a 2.5 percent decrease in funding to $52.5 million due to some reprogramming of funds. But the administration deserves credit for recognizing the value of the minerals program. It had been under continuous threat during the previous administration.

▸ The National Cooperative Geologic Mapping program budget request is up a fraction at $28.3 million, and the USGS data preservation program is expected to also remain flat at $1 million.

There were no surprises in the president's budget, at least for the programs we track. DOE oil and natural gas programs are perennially under pressure, while carbon sequestration and geothermal present real opportunities for applied geoscience researchers. At USGS chronic underfunding hampers the data preservation program.

* * *

The proposed tax changes have caused great consternation among AAPG members, because of their destructive potential if implemented. It is up to us to explain to our elected officials, friends and neighbors why these tax proposals are bad public policy and why the federal government should be involved in oil and natural gas R&D.

Now is not the time for panic. Now is the time for AAPG members to get personally engaged.

An eye toward broader application

Illinois Basin Shale Gets Tech Focus

By LOUISE S. DURHAM, EXPLORER Correspondent

Considerable media coverage about shale plays leads the uninitiated to think a shale is a shale is a shale.

Not so.

These dense rocks have characteristics that can vary not only from region to region but also within specific plays.

For example, even though natural fractures ordinarily are the principle conduit for production flow in shales, all fractures are not created equal. They vary in numerous ways, including intensity, distribution, size and porosity/occlusion patterns.

Actually, there's no guarantee they even will be present.

The folks at Petrohawk, who discovered the still-new Eagle Ford shale gas play in south Texas (see January EXPLORER), haven't yet seen any natural fracturing in the Eagle Ford core data after drilling a number of wells, according to AAPG member Dick Stoneburner, executive vice president and COO at the company.

The proliferation of domestic shale gas plays has come about through advanced technology, such as horizontal drilling techniques and increasingly efficient frac stimulation treatments, leading to more cost-effective production.

New Albany Shale natural fractures, found in the Illinois Basin; its orientaton is east-west.

Technical Challenges

Economically exploiting these rocks, however, is not necessarily a slam-dunk.

An example is the New Albany Shale in the Illinois Basin, which is the focus of an ongoing R&D project under the aegis of the Gas Technology Institute. The field-based industry cooperative project is funded by the Research Partnership to Secure Energy for America (RPSEA).

The New Albany can vary significantly in different parts of the basin. The goal of the GTI research team is to develop techniques and methods to increase productivity of New Albany shale gas wells to a level where the otherwise non-commercial gas resource may become commercially viable, according to Kent Perry, executive director of GTI's E&P research-supply sector.

Iraj Salehi, senior institute scientist at GTI, is at the helm of the project.

"We're integrating all the necessary aspects of developing a shale resource into this project," Perry said. "The New Albany Shale will require careful consideration of well drilling geometries, accurate formation characterization and completion practices to ensure optimum gas recovery."

Production in the region dates back to the late 1800s when there was considerable oil exploration. Gas was detected as the drill bit passed through the shale, but early experimental attempts to harvest the gas were hindered by the excessively low shale permeability and other issues, according to Perry.

Gas-in-place estimates for the New Albany range from 90 to 160 Tcf, and technically recoverable volumes are estimated to range between 1.9 Tcf and 19.2 Tcf.

Still, the gas wells that have been drilled over the years have yielded limited quantities of gas.

"This combination of limited production and high volumes in place raises the question of why isn't there more production," said Perry, who noted "there's a set of technically complex issues between the two.

"People aren't sure how to frac, where to best locate the wells and so forth," he added.

Two-Way Tech Transfer

The New Albany Shale occurs at surface outcrop and down to as much as 4,500 feet deep; both thermogenic and biogenic gas systems are present. Well costs for a horizontal well with hydraulic fracture stimulation range between $1 million and $1.8 million.

Production is primarily from natural fractures, and production in commercial quantities requires proper placement of horizontal wells relative to dominant fracture

See **New Albany**, page 40

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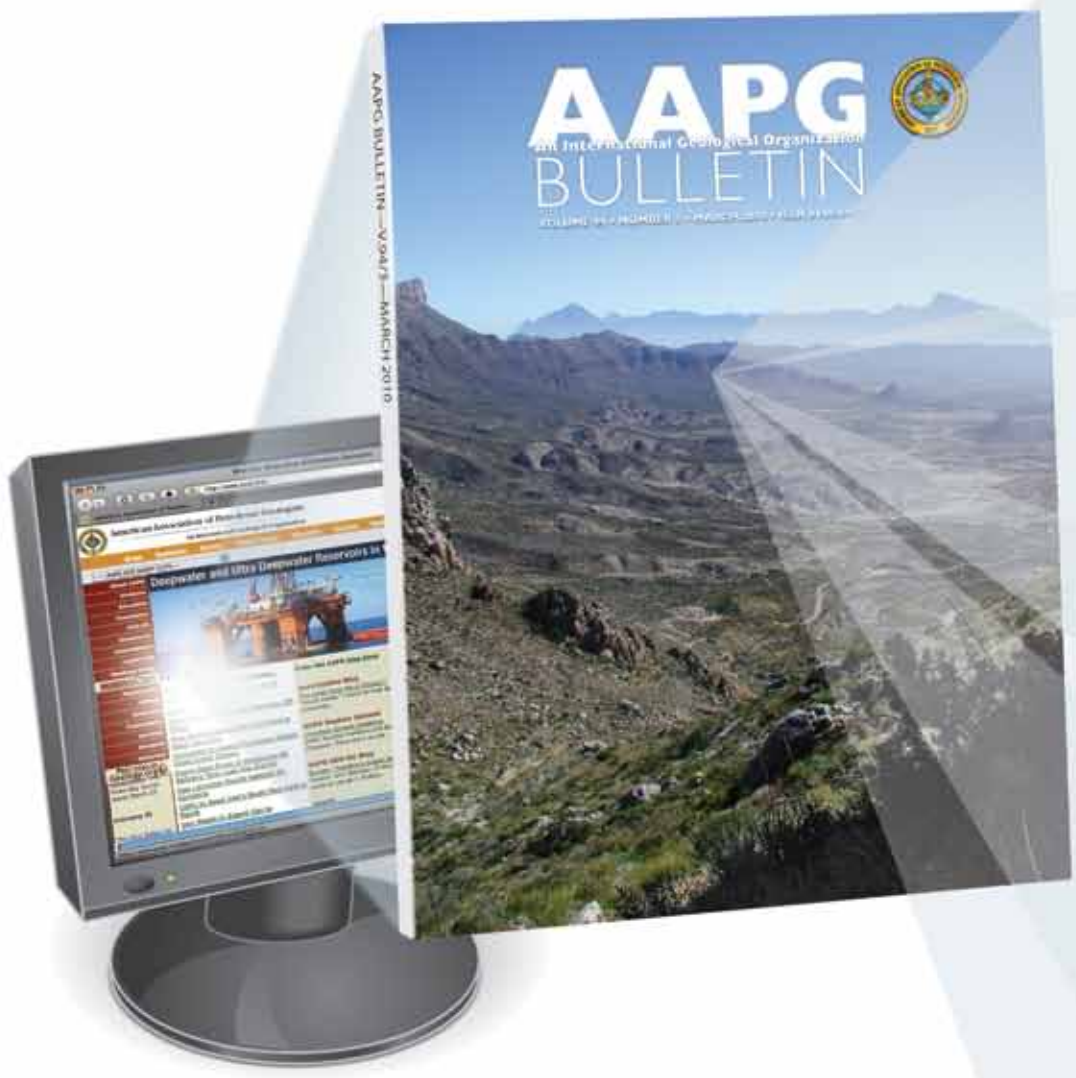

Article highlights include:

Basin-centered gas concept

Tim McCullagh and Bruce Hart

The best gas production in the Cadotte Member comes from chert-rich shoreface and beachface deposits that alternate between tight quartzose sandstone. These depositional features are significant in generating gas-production sweet spots identifiable with thin section, well log, and seismic analysis.

Slope turbidites observed on seismic data

O. Falivene, P. Arbués, J. Ledo, B. Benjumea, J. A. Muñoz, O. Fernandez, and S. Martínez

Synthetic seismic sections and volumes built from reservoir-scale three-dimensional facies models of the outcropping Ainsa slope turbidite system, southern Pyrenees, are analyzed at different scales of heterogeneity and seismic frequencies as an analog for deep-water slope, channel complexes.

Modeling complex reservoir features

Richard Labourdette and Martine Bez

A mathematical relationship exists between the degree of channel story confinement and the stacking architecture of channelized sand bodies as shown in west African turbidite complexes. Channel distribution in these complexes is related to depositional settings.

2010 Annual Convention and Exhibition

Technical Program

This year's technical program includes more than 400 oral and nearly 600 poster presentations. In addition, special forums and sessions are available for an in-depth look at some of the most important issues impacting geosciences professionals today.

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

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New Albany

from page 38

orientation. Owing to the extremely low matrix permeability and limited open natural fractures, interconnecting the fractures via hydraulic fracture stimulation is a must.

This can be a tedious task given that the New Albany is underlain by water-bearing Devonian rocks in some areas. Care must be taken to prevent the fractures from growing into the water-bearing zone.

"We're now about a year into this project, and the team has conducted a couple of field experiments with partner operators in the area," Perry said. "They're looking at detailed core descriptions to better identify natural fracture patterns and formation evaluation issues to better control hydraulic fracture design."

He noted there will be additional field tests to gather data for further study to try to resolve some of the production issues and others that are ongoing.

The project has the potential to benefit shale plays other than the New Albany.

"When we do a comprehensive study of this type, we're always looking to see how far and wide the results might transfer to other geologic basins," Perry emphasized. "Likewise, it's been part of this project to take what learnings have taken place in the Barnett and other areas to see what might apply in this basin as well.

"It's always a two-way tech transfer pathway that's kind of ongoing," he said, "just so we don't duplicate efforts or reinvent things."

Raising 'the Curve'

It's important to recognize that not all technologies applicable to shales translate to each shale.

For instance, the naturally fractured rock supporting biogenic gas generation in the New Albany isn't readily similar to the other high-profile shale plays. Caution is necessary when attempting to transfer outside technologies to the New Albany.

Perry emphasized there are eight important areas that can contribute to a shale play's success in different ways and varying quantitative values, and they should be investigated for every play. The importance of each of these can be different for each shale:

- ✓ Organic richness.
- ✓ Maturation.
- ✓ Gas-in-place.
- ✓ Permeability.
- ✓ Pore pressure.
- ✓ Brittleness.
- ✓ Mineralogy.
- ✓ Thickness.

A number of vertical wells have been drilled and fracture treated in the New Albany. Yet here as elsewhere, horizontal wells provide the opportunity to contact more natural fracture swarms and better contact the reservoir rock.

Initial gas production rates for a New Albany horizontal well with a 2,500-foot lateral are generally 275 mcf/d, declining to 100 mcf/d in the first 24 months. In fact, peak production volumes for these long-lived wells occur in the first 30 days, followed by a significant decline and then a shallow hyperbolic decline.

Cumulative estimated gas production over a 40-year period is one Bcf per well.

Initial high production rates followed by steep declines tend to be the rule for shale plays in general. As the New Albany demonstrates, post-decline production can continue for many years ultimately yielding significant volumes of gas.

Still, there's room for improvement, and this is an industry comprised of folks noted for an almost uncanny talent for developing new technologies to overcome challenges.

The ongoing GTI effort is an example.

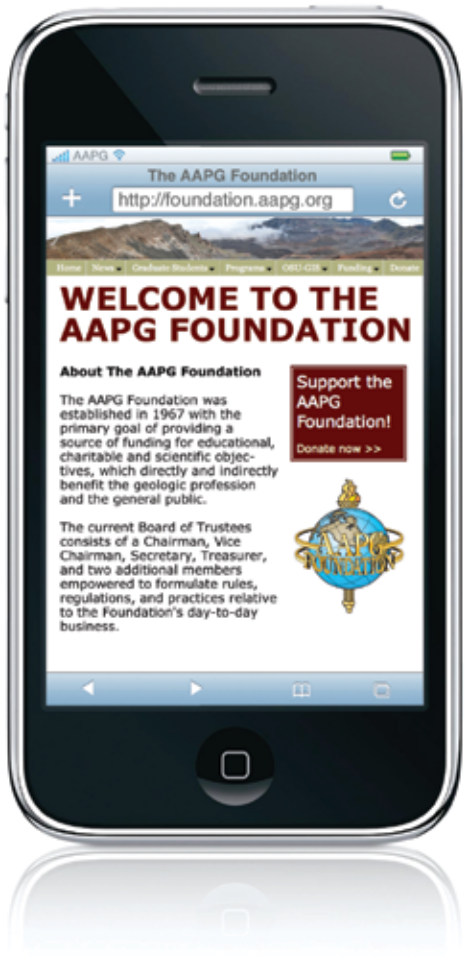
"We don't think the results (of the project) will necessarily be to change that decline curve pattern, but to raise the whole curve," Perry said. "Instead of initial production of maybe 200 mcf a day and declining rapidly, we might be able to get the initial rate up to 500 mcf a day and decline rapidly but then produce at a higher rate over that long period of time.

"The shape of the curve won't change," he said. "We'll just lift it up a bit higher on the graph."

Perry noted they are investigating optimum designs for fracture stimulation, along with the types of fluid to be used.

He added: "If we can stimulate more effectively on long horizontal wells and cut costs, then all of a sudden we could see a lot of activity in that shale."

A A P G F O U N D A T I O N



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A A P G F O U N D A T I O N

Inspiring Future Geologists

Outreach to students from kindergarten through high school is one of the top areas of interest for AAPG members. The AAPG Foundation has been a strong proponent of K-12 activities and recognizes the importance of addressing the issues related to youth science education while influencing young students' knowledge of earth sciences and energy issues.

Currently, the AAPG Foundation provides support to successfully established programs, such as Earth Science Week, More! Rocks in your Head workshops, the Bookout Initiative and National Science Bowl.

NOW is the time to expand the K-12 Education programs! Your involvement is *essential* to increase outreach and awaken young students' appreciation of geosciences and energy.

How can YOU help?

You may direct your **tax-deductible** contribution toward the AAPG Foundation "K-12 Education Fund."

Should you wish to make a gift to the K-12 Education Fund or to receive a five-year pledge commitment form, please contact Rebecca Griffin, 918-560-2644, rgriffin@aapg.org or Alison Robbins, 918-560-2674, arobbins@aapg.org

Gathering in New Orleans

YPs Set Meet 'n' Greet

By BEN KESSEL

AAPG's Young Professionals Committee is organizing an exciting networking opportunity at the 2010 Annual Convention and Exhibition in New Orleans – the second annual Student-Professional Meet 'n' Greet.

As with the timing of last year's inaugural event in Denver, this year's "MnG" will be held on Sunday, April 11, right before the opening session at the Ernest N. Morial Convention Center.

It's designed specifically for those who are:

- A student.
- New to the convention.
- Looking to expand your network with working oil and gas professionals.
- Wanting to mingle with cool geology types.

Seriously, we realize that navigating the convention can be as confusing as that first mapping project at field camp. But have no fear – we're here to help!

The Meet 'n' Greet is structured to allow students who are interested in networking to meet industry professionals – and vice versa.

This year's event will begin at 2 p.m. in room 352 – that's one floor above the La Nouvelle Orleans ballroom, where the opening session will be held.

Participating professionals and students are paired up (usually one or two students for each professional), allowing plenty of time for the pros to share some of their industry experiences. The "pairs" then go to the opening session together, allowing plenty of time for the students to be introduced to even more professionals.

There are many benefits:

- Students, by connecting with working professionals, immediately expand their network exposure.
- Students can get some genuine insight into what the industry is really like.
- All have access the benefits of AAPG.
- There will be a lot of sharing of field camp stories – for all generations.
- All of those past students your professors warned you about – well, meet them!
- All will have at least one more friendly face to see around the convention hall.

We will be sending out more information on how to sign up in the next few weeks, so please stay tuned. For now, any questions should be e-mailed to either Frank Graf at frank.graf@anadarko.com, or to me at ben.kessel@anadarko.com.

We look forward to seeing you in New Orleans.

(Editor's note: Ben Kessel, with Anadarko Petroleum in Denver, is a member of the AAPG Young Professionals Committee.)

Savings Still Available for N.O.

Online registration continues for this year's AAPG Annual Convention and Exhibition – and two big registration deadlines loom in March.

Members who register on or before March 22 can save up to $120 off the regular fee; also, hotel reservations for the AAPG block of rooms must be made by March 12.

This year's ACE will be held April 11-14 at the Ernest N. Morial Convention Center in New Orleans – AAPG's first annual meeting there in 10 years.

The theme is "Unmasking the Potential of Exploration and Production," and a technical program offering more than 400 oral and nearly 600 poster presentations has been prepared to provide the latest in geoscience expertise and insight.

Also offered will be a variety of forums, special sessions and luncheon speakers who will give up-to-the-minute talks on issues that impact the entire industry and profession.

Complementing the technical program will be a large exhibit hall, featuring more than 200 exhibits from industry leaders, independent operators, education providers and more.

A special ticketed social gathering at the National World War II Museum – "An Evening With 'America's Greatest Generation'" – will be offered Tuesday, April 13.

The entire technical program was mailed to members in December, and is available online.

For more information go online to www.aapg.org/neworleans/index.cfm.

HoD Bylaws Proposals Available Online

Proposed amendments to the AAPG Bylaws that will be considered at the annual meeting in New Orleans are available on www.aapg.org.

House of Delegates Chairman Steve Sonnenberg said seven changes are proposed, three of which are "editorial housekeeping."

The other proposed changes would:

- Provide for appointment of Delegates from U.S. Affiliated societies, if such Delegates are not elected prior to 60 days before the annual meeting of the House of Delegates.
- Provide for the Advisory Council to recommend recipients of honors and awards when directed to do so by the Executive Committee.
- Limit the terms of AAPG representatives to non-AAPG committees.
- Provide for standing committee co-chairmen and committee managers and to limit the terms of committee vice chairmen.

In addition to being available online, a printed copy of the proposed changes may be obtained by contacting Regina Gill at 1-800-364-2274, or rgill@aapg.org.

UPCOMING REGIONAL WORKSHOPS

PTTC TECHNOLOGY CONNECTIONS

February
2/11 **Webinar**: Predicting Gas Hydrates Using Pre-Stack Seismic Data in Deepwater GOM (AAPG)
2/18-19 **Midcontinent**: Completion and Stimulation(s) of Horizontal Wells Tight and Unconventional Gas Reservoirs - Tulsa, OK. Contact: 918-631-2979 REPEAT

March
3/1 **Rocky Mountain**: Petra Basics - Golden, CO. Contact: 303-273-3107
3/3 **Eastern**: Chemical Enhanced Oil Recovery - Evansville, IN. Contact: 217-244-2389
3/3 **Midcontinent**: Compact Multiphase Cyclonic Separators and Their Field Applications - Tulsa, OK. Contact: 918-631-2979
3/9-11 **Rocky Mountain**: How to Find Bypassed Pay in Old Wells Using DST Data - Denver, CO. Contact: 303-273-3107
3/16-17 **Geoscience Technology Workshop**: Deepwater and Ultra Deepwater Reservoirs in the Gulf of Mexico (AAPG, Houston Geological Society) - Houston, TX.
3/25 **Eastern**: Michigan Field Experiences - Mt. Pleasant, MI. Contact: 269-387-8633

April
4/2 **Rocky Mountain**: Carbonate Diagenesis, Dolomitization and Porosity Evolution - Billings, MT. Contact: 303-273-3107
4/5-9 **Rocky Mountain**: Complex Well - Core Competency 2010 - Golden, CO. Contact: 303-273-3107
4/8 **Midcontinent**: CBM Produced Water Treatment, Management and Beneficial Use - Oklahoma City, OK. Contact: 918-631-2979
4/19 **Rocky Mountain**: GeoGraphix Training, An Overview and Refresher Course Golden, CO. Contact: 303-273-3107
4/27 **Rocky Mountain**: Log Analysis with JLog Petrophysical Software - Golden, CO. Contact: 303-273-3107

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

Think outside the computer screen.

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

Short Courses:

MAY 11-13
Essentials of Subsurface Mapping
Location: Houston, TX
Instructor: Richard Banks

MAY 17-18
Reservoir Engineering for Petroleum Geologists
Location: Houston, TX
Instructor: Richard G. Green

MAY 19-21
Fundamentals of Petroleum Geology
Location: Houston, TX
Instructor: Stephen L Bend

JUNE 7-9
Exploring for Bypassed Pay in Old Wells Using DST Data
Location: Wichita, KS
Instructor: Hugh Reid

JUNE 9-10
The Petroleum Industry: Upstream & Downstream
Location: Dallas, TX
Instructor: Stephen L. Bend

Field Seminars:

APRIL 17-22
Deep-Water Siliciclastic Reservoirs, California
Location: Begins in Palo Alto and ends at the airport in San Francisco, California
Leaders: Stephan Graham and Donald R. Lowe

APRIL 24-30
Clastic Reservoir Facies and Sequence Stratigraphic Analysis of Alluvial-Plain, Shoreface, Deltaic, and Shelf Depositional Systems
Location: Begins and ends in Salt Lake City, Utah
Leader: Thomas A. Ryer

MAY 16-21
Play Concepts and Controls on Porosity in Carbonate Reservoir Analogs
Location: Almeria Region, SE Spain, begins and ends in Las Negras, Spain
Leaders: Evan K. Franseen, Robert H. Goldstein, Mateu Esteban

MAY 30 -JUNE 5
Complex Carbonate Reservoirs: The Role of Fracturing, Facies and Tectonics
Location: Begins in Naples and ends at Rome International Airport (Italy)
Leaders: Raffaele Di Cuia, Davide Casabianca, Claudio Turrini

JUNE 7-11
Folding, Thrusting and Syntectonic Sedimentation: Perspectives from Classic Localities of the Central Pyrenees
Location: Spain
Leaders: Antonio Teixell, Antonio Barnolas

E-Symposia:

APR 29
Seismic Stratigraphy and Seismic Geomorphology: Applications and Workflows for Lithology Prediction Using 3D Seismic Data
Time: 2:00 p.m. for the live event
Instructor: Henry Posamentier

Online Courses:

LAUNCH DATE APR 1
Biomass Energy Basics – A Renewable Energy Certificate Course
Instructor: Theresa Coffman

Last Chance:

New Date! MARCH 25-26
Field Safety Course for Field Trip Leaders
Location: Houston, Texas
Instructors: Kevin Bohacs, Stephen Oliveri, Robert Clarke

APRIL 10-11
Assessement of Unconventional Shale Resources Using Geochemistry
Location: New Orleans, with the AAPG Convention!
Instructor: Dan Jarvie

APRIL 9-11
Practical Salt Tectonics
Location: New Orleans, with the AAPG Convention!
Instructor: Mark Rowan

APRIL 27-30
Basic Well Log Analysis
Location: Austin, Texas
Instructors: George Asquith and Dan Krygowski

More Science Than You Can Shake A Pick At.

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

SPOTLIGHTON

Young Pro Gives Back to Profession

By LARRY NATION, AAPG Communications Director

Yusak Setiawan is a young professional and a very, very busy man with a lot of responsibilities.

Setiawan recently took a new position as exploration manager for Murphy Indonesia in Jakarta to manage exploration programs in the deepwater South Barito and Semai II blocks.

Murphy signed its first Production Sharing Contract (PSC) in May 2008 for the South Barito Block in South Kalimantan. This was followed, in November 2008, by acquiring the PSC for the 3,379-square-kilometer-Semai II Block offshore south of West Papua.

Thus, Setiawan has his hands full with his job.

But he still takes time to make a difference for his profession – behind the scenes and as a leader and role model.

He first stepped into the AAPG spotlight in 2003 when he recruited 48 new members for the Association and earned a trip to the AAPG International Conference and Exhibition in Barcelona, Spain.

He was then senior geophysicist with Unocal in Jakarta, working on the development of the West Seno Field, Indonesia's first deepwater field.

As his career progressed, his interest in promoting the profession has not waned.

He joined AAPG as a student member while earning his master's degree at Colorado School of Mines on a scholarship provided by the education monies collected as part of the licensing/production agreements in his native Indonesia. He joined Unocal after graduation.

Yusak Setiawan conducted his first Distinguished Lecturer tour in 2008 at Hanoi University of Mining and Geology. He offered a general overview of the petroleum industry and potential careers in the petroleum industry then, and today he continues to talk to students and other groups about the profession and AAPG.

He became lead geophysicist for the Ranggas Field in the Makassar PSC, Indonesia, for Unocal/Chevron (Chevron acquired Unocal in 2005).

In 2006 he joined Hess and moved to Kuala Lumpur, Malaysia, working on a number of projects as senior geophysicist, geophysical adviser and exploration project leader.

He also took time to serve as AAPG Distinguished Visiting Geoscientist to Hanoi University of Mining and Geology, Nanking University and China University of Petroleum.

Additionally, Setiawan has spoken at the Institut Teknologi Bandung (his undergraduate alma mater), Universitas Gajah Mada, Universitas Pembangunan Nasional and the Institut Teknologi Medan - all in Indonesia.

Through his journeys Setiawan has been recruiting new members and sponsoring them to join the Association.

In 2007 Setiawan received a Special Recognition Award for significant contribution in educating non-technical employees on oil and gas industry.

When visiting universities, along with the technical topics such as 3-D modeling, Setiawan advises students "to basically strengthen their technical skills, learn from your mentor as much as possible and be active in the professional organizations such as AAPG."

Additional advice is for the non-native English speaker; Setiawan, who speaks Indonesian, Sundanese (his local language), English "and a little bit of Thai," says, "I would like to encourage them to master English as early as possible in their career because, believe me, it is very essential in this global world."

Does he still recruit for AAPG?

"Of course," he said.

"AAPG is like a gate that has introduced me to the oil and industry world. Through AAPG I have learned so much on different involvement of people in the petroleum industry such as oil companies, service companies, recruitment companies and many others."

He also cites networking as a major membership benefit that is a career asset, learning such things as "technical stuff – best practices – such as what other people have done in other companies."

Also, he appreciates "the opportunity to see the other side of the world, which really also influences in shaping my personality behavior (and understanding of the global community)."

Setiawan also practices what he preaches. He continues to strengthen his technical skills and learn from others – he's planning to attend the AAPG Annual Convention and Exhibition in New Orleans.

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

PROFESSIONAL NEWS BRIEFS

P. Jeffrey Brown has founded ExplAnalysis, Oak Ridge, Tenn. Previously engagement leader-oil and gas practice, Decision Strategies, Houston.

John C. Corbett has been ordained as a priest in the Anglican Communion, Pittsburgh, Pa. He is senior geologist, CNX Gas, Pittsburgh.

James J. Emme, to executive vice president-North America, Endeavour International, Denver. Previously president and chief operating officer, Elk Resources, Denver.

Roger Humphreville, to head of the chief scientists' office and secretary to technology advisory council, BP International, London, England. Previously project benchmarking manager, BP International, Sunbury, England.

Shu Jiang, to research scientist-coordinator for China program development, Energy & Geoscience Institute, Salt Lake City. Previously research associate, Energy Research and Minerals Group, Boulder, Colo.

Glen Mah, to president, GW Mah Petroleum Consultants, Calgary, Canada. Previously geologist, Niko Resources, Calgary, Canada.

Michael W. Maughan, to president, Basic Oil (Calgary), Calgary, Canada. Previously vice president-geosciences and manager-small clients, Sproule Associates, Calgary, Canada.

Mike Mellen, to senior director-research and development, Landmark, Houston. Previously director-geological and geophysical technologies, Landmark, Houston.

K. René Mott, to independent prospecting, Empress Exploration, Houston. Previously senior technical adviser, Seismic Micro-Technology, Houston.

Louis Rothenberg, to Niko Resources, Jakarta, Indonesia. Previously with Black Gold Energy.

Anna Shaughnessy has been appointed director of geosciences e-Learning, International Human Resources Development Corp., Boston. Previously supply chain project manager, Anadarko, The Woodlands, Texas.

Vaughn Thompson, to research scientist, Energy and Geoscience Institute, University of Utah, Salt Lake City. Previously graduate student.

Graham Wall, to chief operating officer, Tethys Petroleum Group, Almaty, Kazakhstan. Previously vice president-technical, Tethys Petroleum Group, Almaty, Kazakhstan.

Fred Wehr, to exploration manager, Apache Energy, Perth, Australia. Previously deputy exploration manager, Khalda Petroleum, Cairo, Egypt.

IN MEMORY

Arthur Erick Anderson, 85
Lafayette, La., Aug. 26, 2009

Wilbur Lewis Durr Jr., 82
Sun City West, Ariz., Dec. 11, 2009

Craig Alfred Lyon, 78
Concord, Calif., Aug. 14, 2009

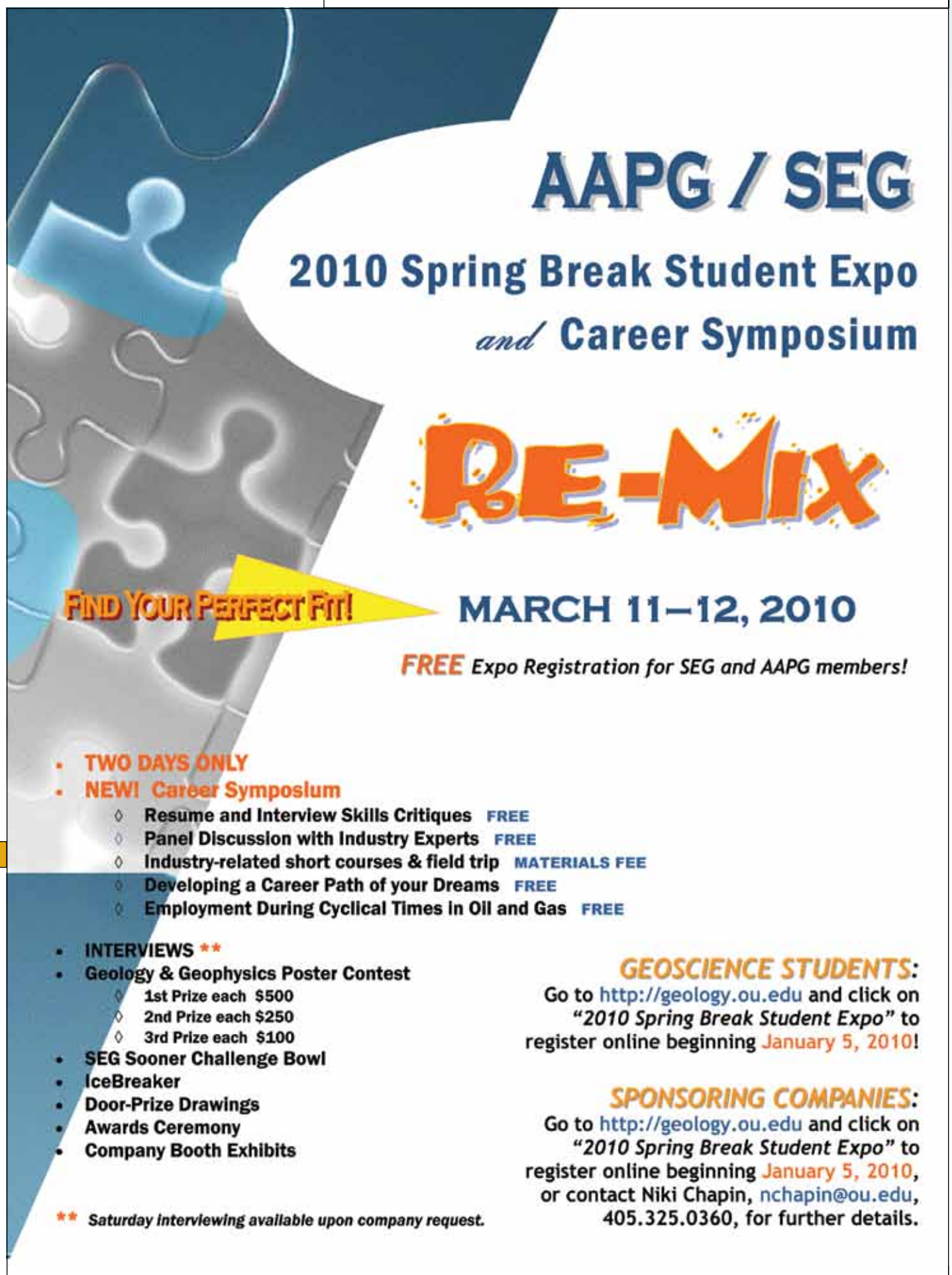
Richard Cornelius McMillan, 61
Birmingham, Ala., Oct. 3, 2009

Sam McDonald Puryear, 64
Fulshear, Texas, May 2009

James William Richards, 78
Saint Helena, Calif., May 28, 2009

Donald Everett Wilson, 81
Albuquerque, N.M., July 19, 2009

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



Editor's note: Regions and Sections is a regular column in the EXPLORER offering news for and about AAPG's six international Regions and six domestic Sections. Contact: Carol McGowen, AAPG's Regions and Sections manager, at 1-918-560-9403; or e-mail to cmcgowen@aapg.org. This month's column includes reporting from AAPG members Anwar Beaiji, Tim Berge, Janice Gregory-Sloan and Adedoja Ojelabi.

57 universities from 18 countries in competition

Imperial Barrel Program Rolls Into New Orleans

By CAROL McGOWEN, Regions and Sections Manager

AAPG's Imperial Barrel Award program (IBA) continues to expand its global outreach as it offers a unique opportunity for earth science students from around the world to analyze real geologic, geophysical, land, economic and production data.

Now in its third year, this year's IBA program, which will culminate in the finals at the upcoming AAPG Annual Convention and Exhibition in New Orleans, will include participation by 57 universities from 18 countries, representing all six international Regions and all six U.S. Sections.

Latin America and Middle East Regions will enter the competition for the first time.

Like no other student program, the IBA program gives students experience interacting with and learning from industry leaders and mentors; it has the power to jolt the career path of students anywhere in the world.

The IBA Committee, led by former IBA coordinators Steve Veal (chair) and Ken Nemeth (vice chair), oversees the global program. IBA Committee member Tim Berge is responsible for the IBA datasets plus coordination of software donations and support.

The committee, working with headquarters staff, is implementing fundamental program improvements this year by embracing new technologies and instituting a clearly written, comprehensive "Rules, Regulations, Operations Manual."

Simultaneously, industry recognition, involvement and support of IBA are on the rise, with new datasets contributed and additional service companies offering free software downloads, training and technical support to universities and IBA teams.

At the local Section and Region level, IBA coordinators recruit schools to participate in the program, secure corporate sponsors and organize sectional/regional IBA events.

For 2010, eight out of 12 IBA coordinators are returning for the second year – a combination of experience and fresh ideas that has sparked several IBA "best practices."

Mobilization

There are reasons why the IBA has the power to mobilize companies, affiliate societies and educational institutions.

The program's focus is on development of exploration skills. Central to the IBA competition is analysis of regional-scale (approximately 100 square kilometers) datasets, presented in the program as project "problems" or "new business ventures."

"This year," Berge said, "we were able to offer seven completely different IBA project 'problems' from five geographic areas – the Danish North Sea, Norwegian North Sea, onshore Australia, U.S. Gulf Coast offshore, Alaska's Bristol Bay and the Barents Sea."

It is Berge's role to carefully modify donated datasets to ensure every IBA team has an equivalent challenge and learning experience. Every project contains real geological data including well curves, 3-D or 2-D seismic data, gravity and magnetic data, Landsat imagery, geologic reports or studies, geochemistry and core data.

"Thanks to our industry partners, affiliate societies and university partners that have donated these datasets," Berge said, including Maersk, Texaco, Alaska Department of Natural Resources, Imperial College London, University of Oklahoma and Petroleum Exploration Society of Australia (PESA).

IBA rules restrict students to one IBA event during their university career, although any university can enter a new IBA team each year. To avoid giving a returning university an unfair advantage over a first-time university, Berge's management of the datasets guarantees that each school's team has a completely new project that is from a part of the world that is unfamiliar to them – even if the university is a previous IBA participant.

Inherent in a global program are variations in hardware, software and bandwidth available to universities from state to state and country to country. Berge makes sure the data are in formats that

Continued on next page

Teams Get Bonus Class

The Gulf Coast Section has discovered that reaching out to local industry to provide training classes, mentoring and to serving as IBA judges not only increases the educational value for students but also builds a network of industry support for the IBA program.

The industry outreach efforts of Janice Gregory-Sloan, second-year IBA coordinator, resulted in ExxonMobil offering two training classes on basin analysis to universities and IBA teams in Louisiana and Texas.

The class provided students with an overview of play elements and play mapping, including two practice exercises. Immediately following the training, teams downloaded their datasets.

"I think that the students in this year's program will feel that it was a good learning experience," Gregory-Sloan said, "and provided them with insights to our industry and the opportunity to begin building their industry network."

Continued from previous page

are understood and usable by the different universities.

The ability to offer a range of software choices, he said, is only possible through the generous support of Schlumberger, SMT, Paradigm and OpendTect, all of which have donated software to the IBA program.

Technical Improvements

In previous years IBA datasets were loaded on portable thumb drives or USB keys, then shipped to university contacts in diverse locales – and with equally diverse mail delivery systems.

This year, nearly 100 gigabytes of IBA project data are hosted on and can be downloaded from the AAPG FTP site. Project datasets are usually in the 1-4 gigabyte range, although some can be as large as 14 gigabytes.

"The FTP site allows us to assign each IBA participant team a password, which enables them to see and download only the project to which they are assigned," Berge said. "With this technical improvement, participants can access the data more quickly and more reliably."

Another technical improvement directly benefits the IBA Committee and the program's historical records. Mike Mlynek, AAPG, assistant manager, (Student Programs) has capitalized on new Web-hosting technology to create a single source for all IBA documents and materials.

Best Practices

Three IBA program practices deserve special mention as "best practices" for adding value to the IBA experience of students and businesses alike.

What are they?

Readers are encouraged to view expanded accounts of these practices on the IBA Web site at http://www.aapg.org/iba. Click on the link, "IBA Best Practices."

Mentors Aid Africa IBA Efforts

The success of the Africa Region IBA Program – 13 universities are vying this year – is built on a strong mentorship program including careful team monitoring using a workflow template.

Since the program was implemented, the number of mentors has doubled from 18 in 2009 to 36 mentors in 2010. Each IBA team is assigned one or more industry mentors who serve as a technical coach to the team.

Volunteer mentors are recruited from members of the AAPG Africa Region and expatriates working in Africa. Selection is based on oil industry experience – particularly in mapping skills and a willingness to share knowledge and provide technical guidance to the students.

Schools and mentors are randomly matched with teams in countries outside their own nationality or work area.

A generic workflow template defines milestones that each team should achieve at a certain time.

"In this way, we are certain that no team is left behind," said coordinator Adedoja Ojelabi, "and all will complete the process.

"The mentor program experience in 2009 shows that interacting with industry mentors is of immense benefit to students, as they learn what is expected of them in the industry – team work, planning, prioritizing, speed, efficiency and work ethics," Ojelabi said, "and we hope that the mentors also benefit from the exchange of ideas and derive a sense of fulfillment from helping another generation of earth scientists learn about the industry."

Experience Counts

Anwar Al-Beaiji, a young professional geologist with Saudi Aramco, is uniquely qualified to serve as IBA Coordinator for the Middle East Region. While a geology student at Imperial College London, Anwar was a member of the 2008 Imperial College IBA team that won second place in the global competition that year.

Anwar last year laid the groundwork for a successful 2010 program by visiting universities in the Region and contacting industry companies to convey the benefits of IBA to both students and universities.

"These efforts led to partial financial sponsorship of the IBA program and technical support to participating universities within the region," Al-Beaiji said.

The 2010 Middle East Region IBA event is scheduled in conjunction with a major regional conference, GEO Bahrain. Invitations to an awards reception following the competition have been extended to geology department heads of all Middle Eastern universities, executives of national, international and service oil companies and industry experts – a strategy designed to raise awareness of IBA among universities and potential sponsors.

Geo India Abstracts Deadline is March 31

The call for abstracts deadline for GEO India 2010, AAPG's South Asian Geosciences Conference and Exhibition, is March 31.

GEO India, co-sponsored with the Association of Petroleum Geologists, India (APG), will be held Dec. 7-10 at the Expo XXI exhibition and conference center in Greater Noida, near New Delhi. The meeting theme is "Exploring and Producing Beyond Frontiers."

Organizers have identified 15 session topics. Abstracts must be submitted online.

For more information go to the GEO India Web site at www.aeminfo.com.bh/geoindia2010/#content.

FOUNDATIONUPDATE

Projects Receive Funding

The AAPG Foundation Board of Trustees recently approved funding of $12,000 to support EXPLORER correspondent Susan Eaton's Elysium Epic Expedition to Antarctica.

The 20-day expedition is designed to celebrate the 100th anniversary of Sir Ernest Shackleton's 1914-1917 Imperial Trans-Antarctica Expedition, but the event includes an educational and outreach component that will begin during the expedition and then, in Eaton's case, will continue for 12 months following the team's return from Antarctica and South Georgia.

Eaton, a Calgary-based independent and professional writer who has reported on Canadian activities for the EXPLORER throughout the past decade, will post blogs and provide classroom sessions during her trip with 11th and 12th grade students in Canada.

You can follow Eaton's blog from Antarctica by going to the AAPG Web site at www.aapg.org (see related story, page 49).

* * *

The Foundation recently received the initial contribution to its newly created Imperial Barrel Award Fund, in the form of $20,000 from Anadarko Petroleum.

Various companies and individuals have provided support for the AAPG's Imperial Barrel Award Program (IBA) in the years prior to the fund's creation, and several pledges already have been made to a Foundation fund that will provide ongoing support.

AAPG's IBA program is an annual prospect/exploration evaluation competition between university student teams from around the world, all competing to win scholarship funds dedicated to petroleum geoscience education created for geoscience graduate students.

The program is rigorous and contributes to AAPG's mission of promoting petroleum geoscience training and advancing the careers of geoscience students (see related story, page 46).

Students who participate in the IBA gain experience using real technology on a real dataset. Additionally, students benefit from the feedback provided by the industry panel, the opportunity to impress potential employers in the audience and the chance to win cash prizes for their schools.

Winning teams are selected on the basis of technical quality, clarity and originality in their presentations.

The IBA is a hands-on opportunity for students to experience the creative process and the high-tech science that is the foundation of the Energy Industry today.

The Foundation's IBA fund was created to allow Corporate Advisory Board companies and individuals to make donations to the overall program or IBA. For other companies the way to sponsor IBA is to complete the form at: www.aapg.org/iba/sponsorship.cfm, which also allows for non-CAB companies to sponsor local IBA semi-final rounds as well as the global finals.

Individuals and companies are encouraged to support the Imperial Barrel Award program. Donations are used to help underwrite the cost of transportation and housing expenses for competing teams, luncheons, icebreakers and cash prizes for the universities of the winning teams.

To learn more about the Imperial Barrel Award Program go to www.aapg.org/iba; to learn more about AAPG core programs funded by the Foundation go to foundation.aapg.org fundsdescription, or contact Foundation manager Rebecca Griffin at 1-918-560-2644, rgriffin@aapg.org.

FOUNDATIONCONTRIBUTIONS

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Norman H. Foster Memorial Grant
Janet L. Foster and Family
In memory of Norman H. Foster

Imperial Barrel Award Fund
Anadarko Petroleum Corp.

K-12 Education Fund
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John McCamey Sweet

Named Public Service Fund
James A. Gibbs
In memory of Donald Reaser

Jack C. and Catherine I. Threet Endowment Fund
Jack C. Threat

Special Publications Fund
John J. Amoruso

WWW UPDATE

Follow Antarctic Trek Via Blog

By JANET BRISTER, AAPG Web Site Editor

Who doesn't love a good story? Especially when it involves beating the odds and overcoming insurmountable obstacles – it's the stuff of which heroes and epics are made.


EATON

Well, we have a good story to tell – one that involves AAPG, a member who happens to write for the EXPLORER, and the continent of Antarctica.

In December 1914, Sir Ernest Shackleton and a crew of 27 set sail for Antarctica. Their objective was to cross that continent from coast to coast – but when their ship became a prisoner of ice they were forced to walk.

For five months they marched through the most uninhabitable place on earth. Then they traveled this world's most dangerous ocean in lifeboats before returning to civilization and ultimately rescuing their remaining crewmembers. Not a single man was lost in this amazing story.

In honor of this feat, a team – called Elysium (elysiumepic.org) – has been formed to visually document Antarctica along the same path Shackleton's expedition took.

(In Greek mythology Elysium is a portion of the underworld where the souls of the herioc and virtuous resides.)

So, what does this have to do with AAPG?

AAPG member Susan Eaton, a Calgary-based correspondent for the EXPLORER, has been invited to the party.

Eaton is one of two geoscientists on a crew of 57 explorers from 18 countries, and she will be posting to a blog as the team journeys from Antarctica and South Georgia. AAPG also will be following her blog on petroleumgeology.org – a Web site designed by the AAPG Public Outreach Committee for the public.

Eaton also has arranged with a school in Canada to share her work directly with their 11th and 12th grade students.

She'll blog, send photos and speak with them throughout the expedition with the hope of illustrating, in Eaton's words "that science is 'cool,' that science is fun, that women participate in science and that exploration and discovery is still possible in the 21st century."

Eaton's blog expands this site with yet another opportunity to "learn about the source, from the source" as it happens.

By the time you are reading this Eaton may be nearing the end of her journey. But her blog should continue beyond that.

It will be a good story.

Good browsing!

The Society for Organic Petrology
27th Annual Meeting
Theme: Advances in Organic Petrology
September 12-16, 2010 - Denver, Colorado, USA

TSOP

TSOP is an international society for scientists and engineers involved with coal petrology, kerogen petrology, organic chemistry and related disciplines

ANNUAL MEETING ANNOUNCEMENT AND CALL FOR PAPERS

Denver, Colorado, USA
Sheraton Denver West Hotel
September 12-16, 2010

Conference Theme:

Advances in Organic Petrology

Field trip to western Colorado, Piceance Basin, to see the Green River Oil Shale

TECHNICAL PROGRAM AND ABSTRACTS, GENERAL INQUIRIES AND REGISTRATION
Mark Pawlewicz
E-mail: pawlewicz@usgs.gov
or
Paul C. Hackley
phackley@usgs.gov

ABSTRACT SUBMISSION DEADLINE: APRIL 19, 2010

Meeting and abstract submission details:
http://www.tsop.org/2010Denver/

TSOP: www.tsop.org

TSOP student research grant
(deadline May 15, 2010)

Meeting organized by the U.S. Geological Survey http://www.usgs.gov

Just ask

Recruit for AAPG

By VICKI BEIGHLE, AAPG Membership Manager

AAPG is calling on all members to recruit colleagues to join our organization.

How? Start by looking for potential members in your company, your local society, at industry events and social gatherings. Ask everyone you know if they are a member of AAPG – and if they say no, or that they "used to be," invite them to join or reapply.

Tell potential members about:

- The many goods and services offered by AAPG – often at member discounts.
- Great networking opportunities.
- Our two monthly publications (BULLETIN and EXPLORER).
- The variety of programs, many of them funded by the AAPG Foundation.
- Education opportunities.
- Our graduated dues structure, which is based on the member's annual Personal Gross Income (developed so that no member would be denied access due to financial constraints).

And don't forget to share the personal aspect – share with them how AAPG:

- Has helped your career.
- Has increased your technical knowledge.
- Is a reliable resource for obtaining the latest industry news and staying connected.
- Offers them a chance to be part of a vibrant professional community.

And For You …

There's even something in it for you! For recruiting Active members (new, transfers and reinstatements) you receive recognition as an official AAPG recruiter and can earn points that may be accumulated and exchanged for prizes. Complete details are available online at www.aapg.org/recruit.

Since 1917, AAPG has been the pillar of the worldwide scientific community. Our original purpose – to foster scientific research, to advance the science of geology, to promote technology and to inspire high professional conduct – still guides us today and has helped us to grow to more than 35,000 members in more than 120 countries.

By helping AAPG increase our membership you are helping to expand the knowledge and disseminate the science to more professionals throughout the world.

Applications are accessible via our Web site at www.aapg.org; forms can be downloaded or they can apply online.

We also can provide you with recruiting materials (applications, brochures, etc.); request these via phone – U.S. and Canada toll free at 1-800-364-2274; all others, 1-918-584-2555; or via e-mail to members@aapg.org.

BAKKEN AND BEYOND!

2010 Williston Basin Petroleum Conference & Expo

May 2-4, 2010 • Civic Center • Bismarck, North Dakota

Technology - Infrastructure - Equipment - Industry development

75+ speakers
- US and Canadian officials and industry leaders

300+ exhibits
- indoor and outdoor

WBPC brings together many industry representatives, regulators and political leaders from across the U.S. and Canada, all with a vested interest in the Williston Basin.

Hosted by: ND Petroleum Council, ND Department of Mineral Resources, Saskatchewan Ministry of Energy and Resources

General registration is available online at
www.ndoil.org

From Mountains to Main Street
May 2010
Anaheim, CA
Cordilleran GSA & Pacific Section AAPG

Pacific Section of the AAPG 2010 Convention Anaheim, California

The 2010 combined meeting of the Pacific Section AAPG and the Cordilleran Section GSA will be held at the Anaheim Marriott in **Anaheim, California** - May 27-29, 2010. The Society for Sedimentary Geology, Society of Exploration Geophysicists and the Society of Petroleum Engineers will also to be part of this convention. We expect more than 1500 geological and engineering professionals from throughout North America to attend this event.

All information concerning courses, field trips and registration, can be found on the following site:

http://www.geosociety.org/sectdiv/cord/2010mtg/

Registration is online and active!

THE GEOLOGICAL SOCIETY OF AMERICA
Cordilleran Section

SEPM
Society for Sedimentary Geology
PACIFIC SECTION

Pacific Coast Section
SEG

MEMBERSHIP&CERTIFICATION

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

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

Information included here comes from the AAPG membership department.

(Names of sponsors are placed in parentheses. Reinstatements indicated do not require sponsors.)

Membership applications are available at www.aapg.org, or by contacting headquarters in Tulsa.

For Active Membership

California
Henderson, Jean M., Warren E&P, Long Beach (C.P. Henderson, D.E. Hoyt, L.C. Knauer); **Winslow, Donald Joseph**, Chevron, Bakersfield (reinstate)

Colorado
Gordon, Henry H., Strata Resources, Denver (W.J. Barrett, M.S. Johnson, S.A. Sonnenberg); **Keay, James P.**, International Reservoir Technologies, Lakewood (R.G. Hickman, T.P. Seeley, L. Brinton); **King, Jared David**, Norwest Corp., Denver (J.A.M. Thomson, W.F. Hoppe, J.E. McCray); **Miskelly, Thomas E.**, San Jacinto College, Englewood (C.A. Sternbach, L.R. Sternbach, H. Chafetz)

Indiana
Ward, Thomas Paul, Citizens Energy Group, Worthington (D.L. Gelhausen, D.W. Busch, J.D. Pigott)

Ohio
Holm, Daniel K., Kent State University, Kent (I.D. Sasowsky, L.H. Wickstrom, A.H. Coogan)

Oklahoma
Allen, Gerald, Continental Resources, Enid (B.P. Thies, R.W. Allen, C. Haugen); **Ardoin, Charles Russell**, Samson Resources Co., Tulsa (C.F. Clawson II, J.E. Mathewson, R.K. Soderberg); **Herrin, James Matthew**, Chesapeake Energy, Oklahoma City (S.P. Cooper, J.C. Lorenz, A.W. Jackson); **Marfurt, Kurt J.**, University of Oklahoma, Norman (R.M. Slatt, S. Mitra, G.R. Keller Jr.); **Thapar, Mangat R.**, International Geophysical, Tulsa (R.B. Banks, H.F. Miller, F.J. Wagner Jr.)

Texas
Croy, Matthew James, Halliburton, Houston (K.E. Williams, J.L. Gevirtz, T. Sheehy); **Davis, Clayton Y.**, Southwestern Energy, Houston (V.J. Atkinson, S.E. Matson, K.L. Martin); **Parsons, April Louise**, Statoil USA E&P, Houston (D.M. Cox, P.A. Santogrossi, C.C. Moss); **Remington, Lisa Elaine**, Drilling Info, Austin (D. Ratcliff, S.P. Dutton, R.H. Trevino); **Shelander, Dianna**, Schlumberger, Houston (reinstate); **Shumaker, Adam Niven**, Noble Energy, Houston (D. Johng, C.T. Balistrire, G.A. Olson); **Thacker, Thomas Tydings**, 3-T Exploration, Wichita Falls (J.L. Hickman, W.H. Nichols, G.M. Godwin)

Wyoming
Ver Ploeg, Alan James, Wyoming State Geological Survey, Laramie (R. De Bruin, J.F. McLaughlin, Z.S. Jiao)

Australia
Jewett, Kelsey, Otto Energy Limited, West Perth (J.J.K. Poll, C.J. Martin, R. Sadownyk)

Bangladesh
Lodhi, Abid Nowaz Khan, Cairn Energy, Dhaka (A.M. Shamsuddin, S.H. Chowdhury, R.M. Akhlaqur)

Brunei Darussalam
Carl, Brian Stewart, Shell Petroleum, Seria (D.A. Hutchison, J.C. Zura, M.C. Dean)

Canada
Turner, Elizabeth Coral, Laurentian University, Sudbury (A.F. Embry, B. Beauchamp, D.G.F. Long)

Kuwait
Chakraborty, Kalyan Kumar, Kuwait Oil Company, Ahmadi (S.K. Newton, J.R. Weston, P. Thompson)

Libya
Al Ghazali, Al Mabrouk, Chevron Libya, Tripoli (J.P. Nixon, J.A. Boyer, P. Mazalan)

Malaysia
Ngu, William, Sarawak Shell Berhad, Miri (R. Franssen, C.K. Choo, H.P. Lee)

Morocco
Boutib, Lahcen, ONHYM, Rabat (H. Jabour, M. El Mostaine, J. Redfern)

Nigeria
Lawal, Taofiq Alaba, Conoil Producing/ Compurex, Lagos (O.T. Odusote, A.O. Ekun, A.T. Adelaja); **Oke, Olatunbosun Ayotunde**, Shell Petroleum Development Company, Nigeria, Warri (E.C. Arochukwu, S.O. Akande, G.O. Giwa); **Olafisan, Bukola Bolajoko**, NNPC-NAPIMS, Lagos (M.D. Bako, D.S. Sejebor, C.P. Okoro); **Pinnick, Sotonye Beniboba**, NNPC-NAPIMS, Lagos (E.G. Gwong, E.A. Okpokam, M.D. Bako)

Oman
Al Hosni, Yaqoub, OXY, Muscat (M.N. Bushara, K.K. Al-Riyami, A.P. Heward)

People's Republic of China
Hao, Fang, China University of Petroleum, Beijing (S. Li, X. Xie, J. Ren)

Poland
Kotarba, Maciej Jerzy, University of Science and Technology, Krakow (reinstate)

Qatar
Cromie, Helen, Maersk Oil North Sea UK, Doha (F.S. Van Buchem, G. Templeton, D.R. Cook)

Scotland
Guo, Jiulin, BP, Aberdeen (A. Milne, D. Barr, B.E. Holdsworth)

United Arab Emirates
Darma, I Wayan Ardana, Mubadala Oil & Gas, Abu Dhabi (G. Burgon, P.G. Landmesser, J.A. Bates)

Wales
Crossley, Rob, Fugro Robertson, Penmaenmawr (R.C. Shoup, J.P. Harris, C.K. Peter)

Certification

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

Petroleum Geologists

Texas
David G. Rensink, retired, Houston (American Institute of Professional Geologists); **James B. Hersch**, W&T Offshore, The Woodlands (reinstatement)

Editor's note: Gerhard, retired Kansas State Geologist, is past president of the AAPG Division of Environmental Geosciences and editor of AAPG Studies #47 Geological Perspectives of Global Climate Change.

Commentary

'Climategate' and the Ethics of Science

By LEE C. GERHARD

Dishonesty in science can harm people.

Over the last century science has played an ever-increasing role in the lives of all people. Science has increased life expectancy, improved our standard of living, dramatically speeded communications and made us a space-faring people, to cite only a few examples. Our ability to feed a rapidly growing global population and to make their lives easier and more productive both stem from advances in science.


GERHARD

> Acceptance of advocacy or dishonest science has become an issue in recent years.

The downside of the ascent of science into public life is that politics uses science that supports particular views while suppressing contrary views. The entry of science and technology into politics and public policy demands that scientists be vigilant in guarding their professional objectivity from political influence or philosophy, and to defend their science from perversion by social, religious or political agendas.

Today we are faced with both dishonest science and quasi-religious persecution of dissenting scientists who are not in agreement with social or political dogma. Acceptance of advocacy or dishonest science has become an issue in recent years.

History is replete with examples of either scientific dishonesty or interference with or absolute brutal repression of science. Bruno was burned at the stake in the inquisition, and Galileo, faced with similar circumstances, was forced to recant his observations of the universe in front of religious authorities in the 16th century.

A legal form of scientific dishonesty is the demonizing of opponents in a scientific disagreement. Rather than counter the scientific arguments, some attempt to deflect the debate by arguing that the opponents are incompetent, funded by corporations, have conflicts of interest or are harming the public welfare, demeaning their work and data in every way possible, without ever demonstrating any inaccuracy in the work. While perhaps acceptable in politics, such tactics are not acceptable in science.

A recent example of such an ad hominem attack was the attempt to silence Bjorn Lomberg, author of "The Skeptical Environmentalist." Lomberg had devastated zealous environmentalist's arguments that the natural world was being continually degraded by human impacts, using both data and statistics to demonstrate that the global environment was improving and that the world needed to address larger problems first, rather than expend resources on minor issues. Lomberg was castigated verbally, in the press and in tribunals. Lomberg fought back and was vindicated.

Against that historical background there is now "Climategate." Climategate is the term used to describe the release of thousands of e-mails from the University of East Anglia's Climate Research Unit (CRU), one of the most prestigious climate data archive and modeling centers. CRU data is the basis for much of the debate about climate change. The e-mails document scientific dishonesty among the leading scientific proponents of human-induced global warming (AGW), and the major players behind the United Nations Intergovernmental Panel on Climate Change, both in England and the United States.

Examples of disclosed dishonesty include purposeful manipulation of data in support of a favored hypothesis, conspiracy to deny access to data to others (illegal under Freedom of Information actions), destruction of data, attempts to deny others access to peer review and scientific publication process, impugning the reputations of others and attempts to remove journal editors who published works that did not support AGW. While each individual act is worthy of termination from a scientific research or teaching position, the sum total of these dishonest acts is an indictment of the entire scientific process concerning climate change.

Science works by advancing a hypothesis, continually testing it, modifying as necessary, retesting, all in attempts to falsify or invalidate the hypothesis. Hypotheses that survive these tests then become accepted theories and the base from which other constructs can be developed. That is the scientific method.

An example is Plate Tectonics. Advanced seriously as "continental drift" in the early part of the 20th century, the hypothesis was tested but not established owing to a lack of information to create a rational test. There was heated debate over the hypothesis, without resolution. After World War II ended, heretofore secret military sea-floor mapping was made available to scientists, who then identified

Continued on next page

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

READERS' FORUM

Students Need Help

I am an MSc candidate in geology at the University of Ibadan in Nigeria, and will graduate by the middle of 2010. I read with keen interest the comment by Kody Kramer (Readers' Forum, January EXPLORER), who gave a vivid picture of the major challenge encountered by fresh geoscientists in finding entry-level positions with oil and gas companies – especially in the wake of the recent global financial crisis.

While I am not put off by the fact that Kody and other students have been forced to take jobs in food services and retail, I cringe at the big wigs (the AAPG members occupying managerial positions and above), the recruiters and the like for not going the extra mile in ensuring that these neophytes get on the track …

If the scenario given by Kody exists in God's Own Country (i.e., the United States), I wonder what the future holds for those of us in Nigeria, South Africa, Egypt, Ghana, etc. If an MSc candidate from Louisiana State University is in such a dilemma, despite the qualitative and quantitative educational standards there, what will become of the rest of us in Africa, where the educational standards are nothing to write home about?

More so, when it comes to global competitiveness in such events as the Imperial Barrel Award or grants offered by the AAPG Foundation, these northern and southern universities are assessed equally with the same yardsticks. I think it should not be so.

And if, according to Kody, there are 13,500 AAPG members in managerial positions and above, and only 5,000 Student members, that means that for every two AAPG manager-position members there is ONLY one student requiring his/her help to enter into the labor force. AAPG should watch this ratio closely and take action; it is one of the ways by which professional enthusiasm in AAPG will be further sustained.

Okoko Davidson Chidiebere,
Ibadan, Nigeria

Continued from previous page

magnetic polarity reversals in stripes across the ocean floor, with age-dating that proved symmetrical spreading from mid-ocean ridges. That test confirmed seafloor spreading, continental movement and provided what is now the basis of our now integrated and unified theory of Plate Tectonics. It took 50 years and new technology to rigorously test the hypothesis. Even so, scientists still continually test the theory.

Climategate is a disaster for science in general because the combined transgressions suggest the leaders of the AGW hypothesis violated every tenet of scientific ethics for one simple reason: To prevent expert testing of the AGW hypothesis and its potential falsification.

The result has been the acceptance of the hypothesis by political and social policy entities as a reliable scientific theory, without scientific validation.

I have encountered several instances of scientific dishonesty in my career, including falsification of chemical test results, lying about progress on major interagency projects, and plagiarism. None of these instances hurt people other than the perpetrators, the costs were in time and money.

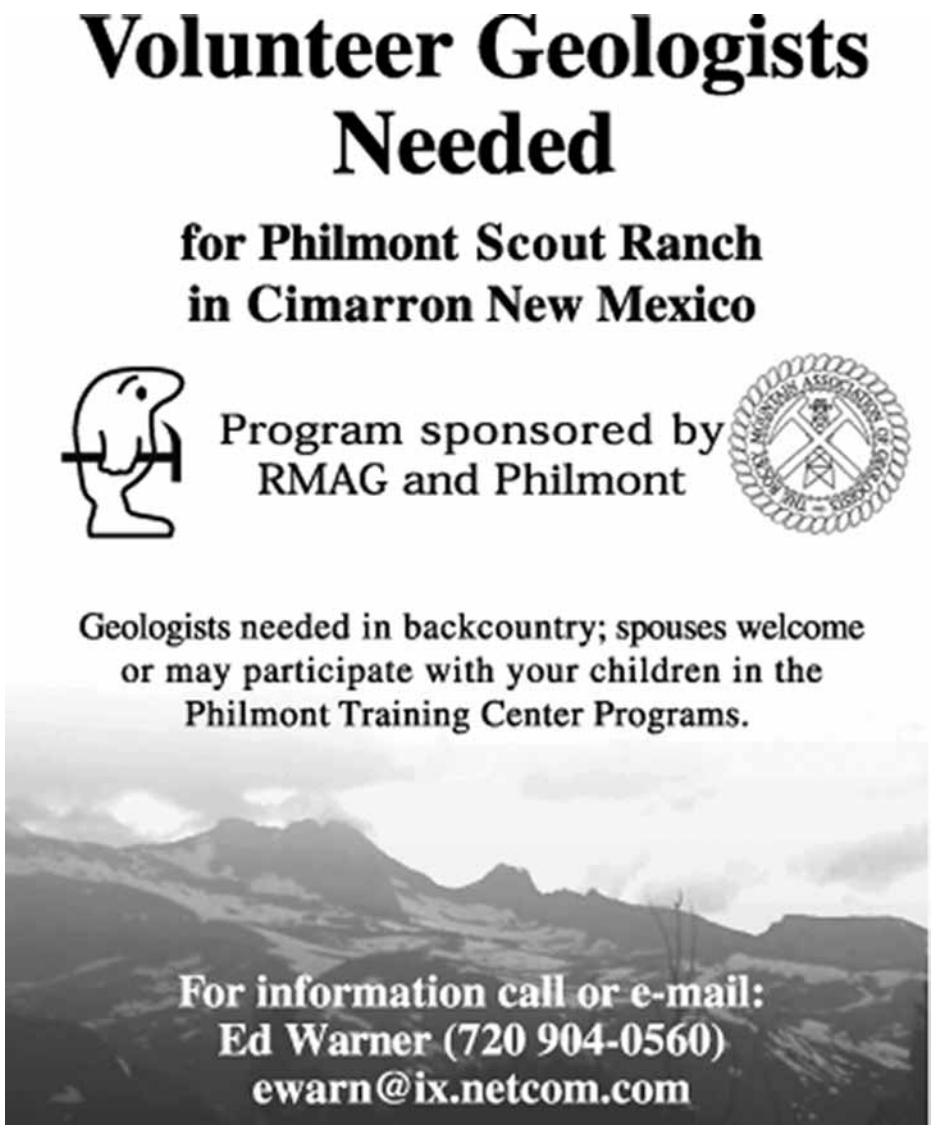
We cannot permit government-encouraged "scientific correctness." Eighty years ago, Lysenko's false science, and iron control of Russian botanical science, helped starve the Russian people. Previously cited examples of dishonest science impacted fewer people, small areas and, as in Bruno's case, were only lethal to the individual.

Climategate is different. Climategate's ethical impact is global.

Proposed draconian measures to constrain energy use would harm poor peoples all over the globe. We have already converted much-needed food into motor fuel. Literally billions of dollars of scientific and public policy investments have been made suspect, if not worthless. Continued attempts to impose strictures on emissions of carbon dioxide are not only not useful, they are meaningless in terms of climate change while costing average Americans thousands of dollars each year.

Regardless of our social philosophies, our science must remain objective.

You can reach about 30,000 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.



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Review of applications will begin by April 1, 2010.

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POSITION AVAILABLE

Petroleum Engineering

Missouri University of Science and Technology
Geological Sciences and Engineering Department
Assistant Professor of Petroleum Engineering

The Geological Sciences and Engineering Department at Missouri S&T anticipates a tenure track faculty opening in Petroleum Engineering at the assistant professor level beginning Fall 2010 or earlier. Successful applicants will have a strong background in mechanical earth modeling and finite element analysis. Candidates must have an earned PhD in Geophysics or Petroleum Engineering that is appropriate to support research and teaching in mechanical earth modeling and related areas, preferably with experience in interdisciplinary settings. Solid oral and written communication skills are essential. Experience teaching mechanical earth modeling and finite element analysis is desirable. Documentation of good teaching is desirable. Experience teaching commercial software packages such as: GOCAD, PETREL, HyperWorks and Abaqus is expected.

The successful candidate is expected to develop a creative and productive research program in mechanical earth modeling and related areas. This research should be independent and interdisciplinary/interdepartmental. Developing contacts with industry and research centers is encouraged. The appointee is expected to teach at the undergraduate level in mechanical earth modeling and related areas, and to develop graduate level course(s) in his/her area of specialization. Supervision of graduate students, student advising, participation in outreach programs, curricular development, and performance of university service are expected.

Missouri S&T is the technological campus of the University of Missouri system. There are approximately 6800 students (5200 undergrads, 1600 grad students) in 65 different degree programs. Missouri S&T was ranked 45th overall and 12th among public universities by American high school counselors in the US News and World Report "America's Best Colleges 2009," and a "Top 20 STEM Research University" by Academic Analytics (January 2008). The Geological Sciences and Engineering department consists of 19 faculty, over 300 undergraduate, and over 50 graduate students in Geology, Geophysics, Geological and Petroleum Engineering.

For additional information (but not to submit applications) contact Dr. Ralph E. Flori, Head of Petroleum Engineering, 318 McNutt Hall, Rolla, MO 65409; reflori@mst.edu; (573) 341-7583.

Applications should be received as soon as possible and review will continue until the position is filled. Please submit application and vitae to:

Human Resource Services
Reference Number: R00050335
Missouri University of Science & Technology
113 Centennial Hall
Rolla, MO 65409
http://hr.mst.edu/employment/petroleum.html

Missouri S&T is an AA/EOE and does not discriminate based on race, color, religion, sex, sexual orientation, national origin, age, disability, or status as Vietnam-era veteran. Females, minorities, and persons with disabilities are encouraged to apply. The Missouri University of Science and Technology is responsive to the needs of dual-career couples. Missouri S&T participates in E-Verify. For more information on E-Verify, please contact DHS at 1-888-464-4218.

The person selected as the final candidate for a position may be required to provide appropriate verification, prior to the beginning date of employment, that the person possesses the credentials stated on all application materials submitted. Failure to provide such verification may result in the withdrawal of a job offer.

* *

Petroleum Exploration Geologist
Newfield Exploration
Tulsa, OK

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

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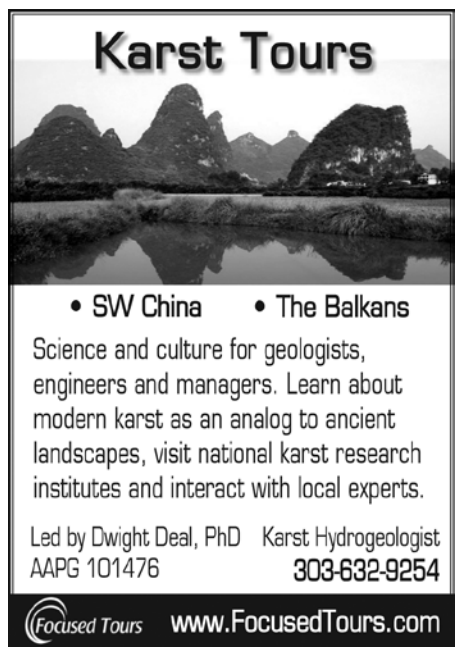

Rocknocker: A Geologist's Memoir
(ISBN-13: 978-1-926585604)
By George Devries Klein.
This book reviews the life of George Devries Klein, an immigrant who made it through the American System as a geologist. It chronicles his life from early childhood, graduate school, oil company researcher, university professor, science administrator, and as a geological consultant. Each chapter summarizes key lessons. Book discusses rationale behind research projects George completed. A highly informative read.

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DIRECTOR'SCORNER

Taking It to the Next Level

By RICK FRITZ

In his book "Good to Great," author Jim Collins talks about what makes a great company. His first line in the book is, "Good is the enemy of Great!"

I think that Collins is saying it is often easy to be satisfied with the status quo when everything is going well. Sometimes I think it takes a greater effort to move from good to great than it does poor to good.

In the Association we wrestle with these concepts constantly. AAPG has a number of good programs, but we also have a very complicated list of programs – some of which need improvement. The question is, "How do we make those programs the best?"

The answer is usually to *focus* on core values and *listen* to the membership about their needs.

* * *

Communication is a key element to improvement.

I recently traveled to the Asia-Pacific Region to meet with Joe Lambiase, the AAPG Region president, and the Region council. I also met with Adrienne Pereira,


FRITZ

AAPG's Asia-Pacific office managing consultant in Singapore.

On the way to Singapore I stopped in Japan and Malaysia and met with members, students and industry representatives. It was a great trip and I learned a lot by listening to the needs of the membership.

I also met with the presidents and officers of two AAPG's affiliated societies – the Geological Society of Malaysia and SEAPEX. Both have good programs; it is important for AAPG to coordinate and communicate its programs with the societies to make sure we do not overlap.

In the Asia-Pacific Region, the leadership and staff are considering what is "best" to provide to our membership, the larger petroleum community and even the general public. AAPG Distinguished Lecturers are well received and the program is considered excellent; however, there is a need for more lecturers. As a result the Executive Committee is considering expanding the mission of the Visiting Geoscientist Program so we can reach more people in the area.

Professional development is another area of opportunity. AAPG is looking for its "niche" in the Regions as we discover needs for education. It appears our best tools will be Geoscience Technology Workshops and e-symposiums. We also will examine opportunities to develop and co-sponsor regional geoscience meetings.

In addition, there appears to be a need to develop chapters or "professional groups," especially in areas where there are no affiliated societies. The AAPG Executive Committee has approved this in concept and we are in the process of developing a set of guidelines.

* * *

After I returned from Singapore I traveled to Wichita, Kan., to give a talk to the Kansas Geological Society. There I had the opportunity to talk to several members about the needs of the membership, and to consider the best programs AAPG can provide to the Affiliated Societies and Sections.

In fact, my meeting with Affiliated Societies, both in the Regions and Sections, is part of a program instituted this year by President John Lorenz to have AAPG's leadership and senior staff visit society meetings and consider the needs of the membership.

* * *

In "Good to Great" the author states that you must answer three questions:

- What are you deeply passionate about?
- What can you be the best in the world at?
- What drives your economic engine?

These are great questions to consider as we look to expand AAPG and take it to the next level.

DIVISIONS'REPORT

Imagine a broadened skill set

DEG Covers Broad Interest Spectrum

By MICHAEL A. JACOBS, DEG President

Every now and then I get the opportunity to talk about the AAPG, and in particular the Division of Environmental Geosciences – but until now I have not had the opportunity to discuss the DEG with such a wide audience. And as I may never get this chance again, I am going to take this opportunity to tell you some things about the DEG and whom we are.

First let me explain where I am coming from and give you some examples of what many of the members in the DEG do.

I am a 35-plus-year AAPG member, but have been in the DEG for only about six years. When I first joined the DEG I didn't really know much about the Division – and if you are not familiar with the DEG you may find yourself asking the same question I had: Just who are these DEG folks?

I have since come to embrace, respect and appreciate the diversity of the members of this division. As you will find, they are mostly a group of geoscientists who have many wide and varying interests, much like me. I like diversity in geosciences, and if you do too, and are looking for a fun place to come and unwind – you know, a place to get away from the 8-to-5 grind of sitting at the workstation, classroom or office – and if you are interested in learning some different styles of geological and geophysical exploration on the fringes of E&P, this is definitely the place for you.

* * *

The following are just a few examples of things that DEG members ponder:

- For instance, the recent devastating earthquake in Haiti has reminded us all


JACOBS

of the fine balance between human life and geology. Catastrophic events such as tsunamis, earthquakes, volcanoes, mudslides, etc., all are geo-hazards, all of which are of great interest to scientists in the DEG, particularly those in the DEG's **Geo-Hazards Committee**.

- Then there are DEG members who are busy keeping unscrupulous land developers, who like to build and sell multi-million dollar houses on range front faults and rockslides to movie and rock stars, from doing so. OK, this is not tragedy of the same scale, but it can probably be traumatic to the homeowner.

- The DEG has a **Hydrogeology Committee**. Do they do anything interesting? Is there anything you can learn from them? Before you decide, ponder this real-life example:

Let's say you are a geologist tasked with removing a slug of brine water from an aquifer. For the sake of an analogy for the petroleum geologists, let's call the aquifer a reservoir and let's call the slug of brine your target. Your target is located within an extremely heterogeneous clastic reservoir and horizontal wellbores, hydrofracing, etc., is not an option, so you can't manipulate the reservoir and just drill wells anywhere you want.

Also you can't depend on reservoir pressure to push your target to the wellbore, because your reservoir at this depth is at atmospheric pressure. So you have to drill wells and pump them at a certain rate, which is totally dependent upon the permeability and porosity of the reservoir rock within that wellbore.

You also have limited resources, so you need to place your wells where they will do the most good, don't interfere with each other and have the exact radius of influence to recover your entire target.

Now, let's complicate matters a little – because your target is brine, unlike oil, which is floating at the top of a nice trap with a seal; it is denser than the surrounding fresh water; and it is hugging the undulating, unconformable surface of the underlying, impermeable formation.

It also is confined to a paleochannel incised in bedrock and is moving at a rate of 2.5 feet a day in the down dip direction. You will need to drill numerous stratigraphic tests and core the reservoir to gather the needed porosity and permeability data and to also make structure and isopach maps, cross-sections, etc.

All of this then needs to be inputted into a sophisticated 3-D model.

OK, I think you are starting to get the picture.

If you are interested in learning more about hydrogeology, etc., we have DEG members who do this for a living all the time. We can arrange short courses, seminars, symposiums, etc. on the subject.

- Let's say your expertise is mostly geophysical in nature. Using the same analogy above, you want to know the spatial and temporal relationships between the target and the reservoir, without going out and making a pincushion of the earth with wellbores.

There are numerous geophysical methods you can use, many of which are used every day in upstream oil and gas exploration such as seismic refraction and reflection to determine what the underlying bedrock structure looks like. You also can use geophysical methods such as electromagnetic surveys and resistivity profiles to determine the boundaries of the brine target. You can use typical downhole geophysical logging tools, such as induction and gamma ray in the wellbores to better define the vertical variations of the reservoir and target.

Want to learn things like this? We have an **Environmental Geophysics Committee** for you, staffed with world-renowned members who do this all the time.

* * *

This is just a sampling – there is not enough room in this article to even come close to describing all the other things we do in the DEG. If you want to find out more you just have to sign up.

I know you can find out more about these techniques joining other societies, but … hold on. Let me check … oh, yeah, for about $225 a year.

Or you can simply come join us in the DEG and let your imagination run wild.

(Editor's note: Jacobs is senior environmental specialist for Pioneer Natural Resources USA, Midland, Texas.)

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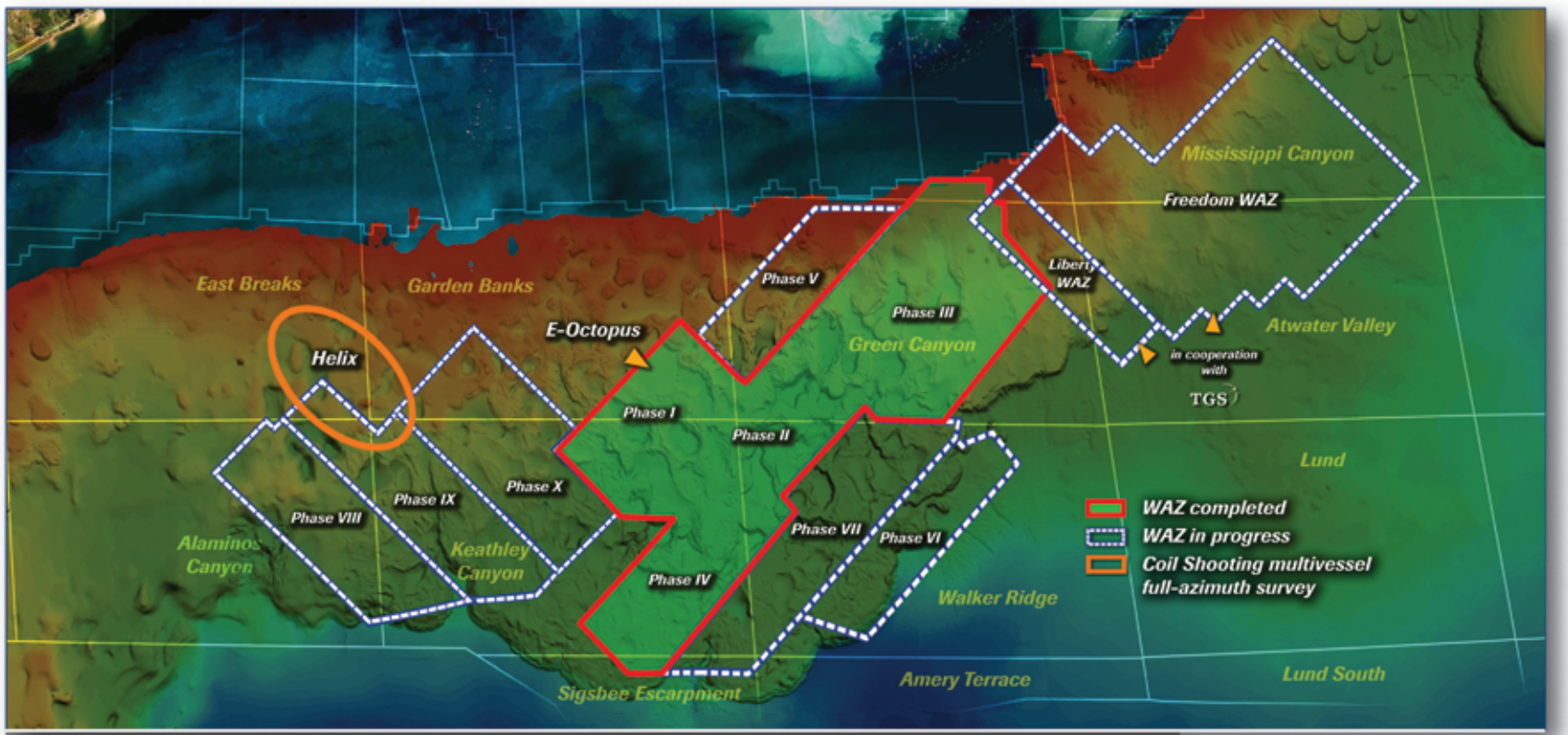

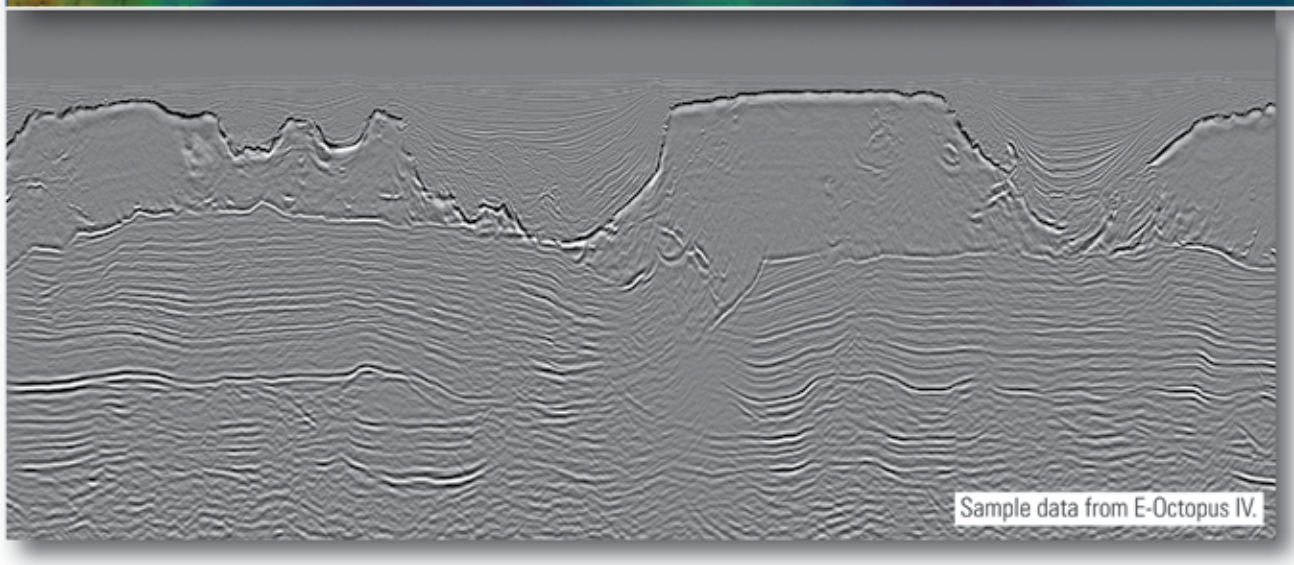

Sample data from E-Octopus IV.

*Mark of Schlumberger. © 2010 Schlumberger. 10-SE-0338

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