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PRESIDENT'S COLUMN

A Time For New Ideas

BY PAUL BRITT

The numbers are not yet in on everything, but the Annual Convention and Exhibition (ACE) in Calgary, Canada is shaping up to be a better than expected success.

It was well attended with 4,257 total attendees and 155 exhibiting companies. The technical sessions went well with 1,834 abstracts submitted, which was a new record, resulting in 808 oral and poster presentations. And the exhibit hall was packed.

This year's ACE also hosted an experiment with an new innovation: the sound system for the technical sessions used FM radio broadcast to personal headsets, solving prior sound problems.

A round of applause goes to the Organizing Committee and to the general chair and general vice-chair, Paul MacKay and Jen Russel-Houston. There is a more detailed ACE recap by EXPLORER managing editor Brian Ervin in this issue (see page 10).

The opening ceremony for ACE 2016 in Calgary.

BRITT

A round of applause goes to the (ACE) Organizing Committee and to the general chair and general vice-chair.

Finalizing the Budget

The Executive Committees, both outgoing and incoming, held their year-end meetings after the convention in Kananaskis (pronounced Cana-nas-kiss) west of Calgary, a location chosen because it was actually less expensive than staying in Calgary. The EC usually holds these meetings in Tulsa on June 30 and July 1, but this resulted in a savings in travel costs since most officers were coming to ACE already.

Both meetings conducted the usual business, and the incoming EC approved the 2016-17 budget to which I referred in my last column as "a nearly balanced budget." At the time of this writing, the budget was being recast for the next EC meeting held the weekend before URTeC in San Antonio, and should be within about 1 percent of a balanced budget.

As we all know, last year was a challenging year for AAPG, our sister societies and the industry as a whole, but we are looking forward this year with ideas for increasing revenue and broadening our base of revenue-generating services. My call last month for ideas from Members has produced a few concepts we will be considering as well.

Membership Update

Membership is reviewed every year, with membership drops typically occurring at the end of the year, because a membership doesn't expire until the end of the full fiscal year after dues have not been paid.

This year, the total dropped was 6,598 in all categories.

Of those, the significant categories were voting Members (1,043), Associate Members (1,922) and Student-YP Members (3,466).

The projections for the end of this fiscal year are not very different.

Certainly, the economic situation is having an impact on membership.

One of the prime goals this year is to stem that tide, and that's where focusing on products and services that Members consider valuable is going to be important. Increasing technical content generation by committees, Technical Interest Groups and Special Interest Groups could help in this regard, will be a focus of the EC.

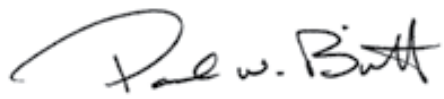
Upcoming Events

As this issue of the EXPLORER is arriving in mailboxes and inboxes, the Unconventional Resources and Technology Conference (URTeC) is under way in San Antonio.

The AAPG-SEG International Conference and Exhibition (ICE) in Cancun, Mexico is Sept. 6-9. It has a full complement of technical sessions, topics that have application in the domestic U.S. basins, and it's closer to U.S. Members than any other ICE will probably be for a long time. Airfare from Houston to Cancun right now is under $400. I encourage you to take a serious look at it.

The 100th Anniversary 2017 ACE is in Houston next April and is shaping up to be a great event. The 100th Anniversary Planning Committee will be running articles in the EXPLORER each month, so watch for those.

July was the first month of the fiscal year, so it was when the EC organized and planned the rest of the year, so it was a good time to consider new ideas and alternatives, so I want to reiterate my invitation to Members to contact me with ideas or questions at paul.britt@aapg.org.



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REGULAR DEPARTMENTS

ON THE COVER:

This field trip to Omya's marble quarry in Middlebury, Vt. is one of the activities of Earth Science Week, an annual event organized by the American Geosciences Institute with support from AAPG. See story on page 16.

Left: Alicia Elias of Apache Corporation and the IPAA/PESA Education Advisory Board with Petroleum Academy students. Photo Courtesy of IPAA/PESA Energy Education Center. See page 22.

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Professor George Davis shares his interpretation of the Hat Creek fault with geologists and cognitive scientists during the 2013 3-D Interpretation Hedberg Conference.

Cognitive Scientists Help Geologists with Interpretation

By KELSY TAYLOR, EXPLORER News Editor

AAPG's Memoir 111 "3-D Structural Interpretation: Earth, Mind, and Machine" will be released this month.

The volume is one of the first to compare perspectives of geologic interpretation from industry and academic practitioners, with consideration of how 3-D cognitive skills impact what geologists think and do.

Editor Bob Krantz noted that everyone has different 3-D abilities and it can often be challenging for academic instructors and industry trainers to help students and employees succeed in building their interpretation skills.

"Geology instructors have long reached out to cognitive scientists to understand how innate skills in 3-D perception and thinking can be developed and reinforced," he said.

He explained that these are often the same skills needed for advanced geologic learning and interpretation.

"Cognitive scientists have shown that these fundamental 3-D skills can be measured, and that training can improve the skills," Krantz added.

Bridging Industry, Academia

This study is significant since, he said, "It provides the first step in bridging the gap between academic and industry methods. That bridge helps educators know about and prepare students for the kinds of geologic interpretation that they will face during their industry careers."

"And it can help provide industry trainers, skills managers and even software designers with insights to improve training, software and methods that recognize how spatial cognitive skills really work in geologic thinking."

Krantz said he feels that it's important to share this new information because "it invites further research from cognitive scientists, who, by the way, think that geologists are some of the best 3-D thinkers around."

The idea for the volume was spurred by the 2013 3-D Interpretation Hedberg Conference. Krantz said the conference grew out of conversations between himself and fellow editor Carol Ormand, who were both interested in comparing academic and industry interpreter skills. They also wondered how spatial thinking affects skill growth and interpreter success.

"The planning for the conference quickly broadened to include software strategies and cognitive scientists. In June of 2013, 70 people representing all of these perspectives met in Reno for a week of presentations, discussions and workshops. We even had a field day with active research," Krantz explained.

The field day took place at the Hat Creek fault system in California. Participants made 3-D interpretations while cognitive scientists observed the day.

"One of the chapters in the volume reports on some results from Hat Creek," said Krantz.

When asked about the latest developments of the study, Krantz noted that there has recently been more collaboration between the industry and academic divide.

"There has also been direct consulting by cognitive scientists with industry training departments," he said. "We would love to see these collaborations grow. One great opportunity would be getting more industry data in the hands of students, and more integration of these data not just with academic research, but with collaborative interpretation efforts between industry and academic geologists."

To learn more, visit store.aapg.org and type Memoir 111 in the search bar.

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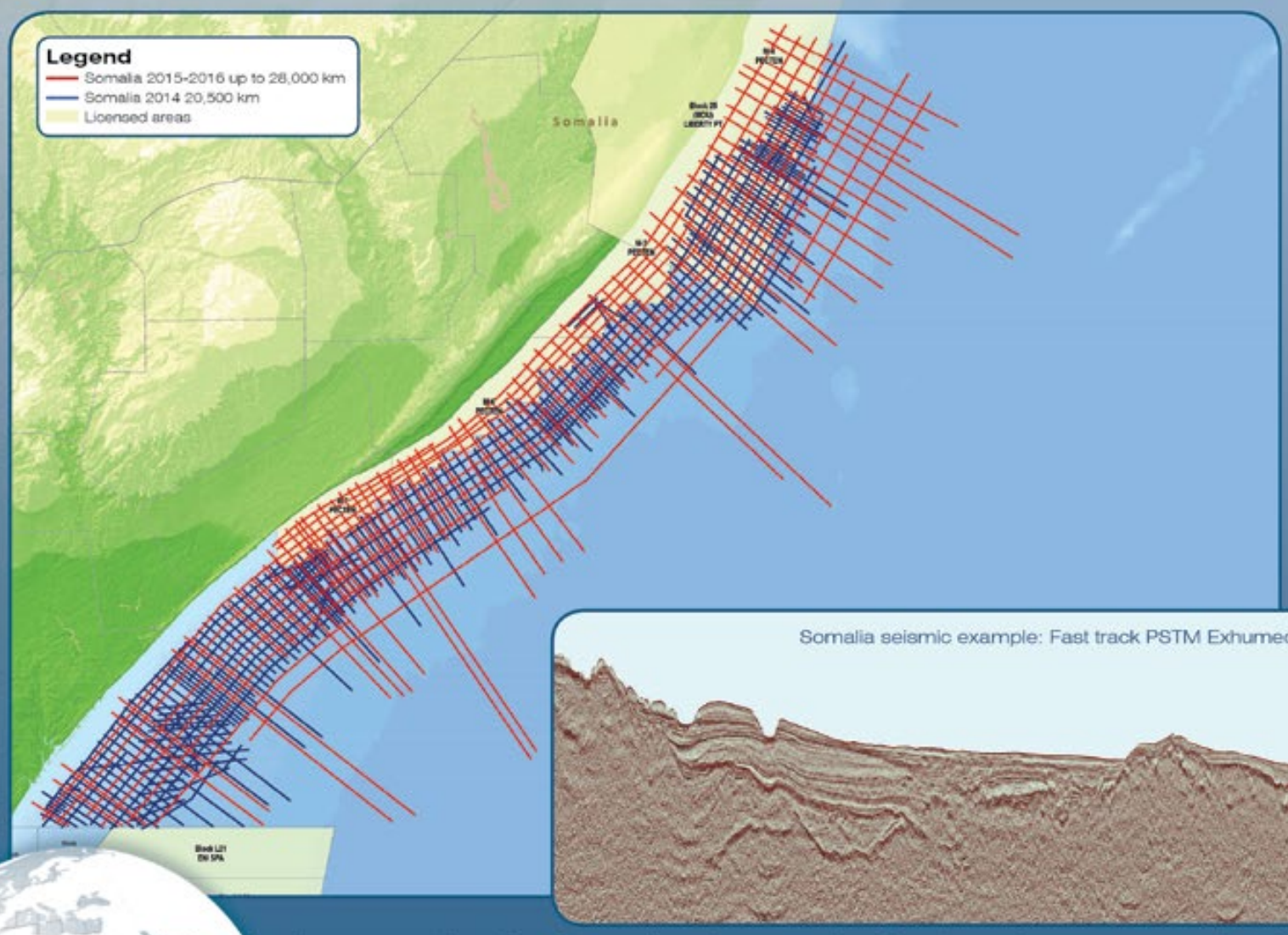

In preparation for future licensing rounds, Spectrum has now completed acquisition of 20,185 km of 2D long offset seismic data, following a co-operation agreement with the Federal Government of Somalia. This program complements 20,500 km of existing seismic data that was acquired in 2014.

The survey design, which covers water depths of 30 m to 4,000 m, has allowed for seismic coverage over the shelf, slope and basin floor with dip, strike and recording time intervals suitable for defining a range of leads and prospects. Streamer lengths of 10,050 m have been used in order to adequately record information at all offsets, further assisting imaging of the underlying syn-rift geometries.

Modern processing algorithms are being applied to the raw data to achieve optimal imaging of the steeply-dipping extensional and compressional features and illumination of subtle amplitude anomalies. Data is expected to become available from Mid 2016.

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Geoscience Education Adapts to New Realities

By DAVID BROWN, EXPLORER Correspondent

Petroleum geoscience courses are still attracting university students, despite the downturn in the oil and gas industry, and those students should benefit from new research in geoscience education as they prepare for future careers.

"Our numbers have barely gone down in undergraduates. As far as graduates, our numbers have just started falling off a little lately," said Mike Pope, head of the Department of Geology and Geophysics at Texas A&M University in College Station.

Texas A&M continues to have almost 540 undergraduate students pursuing geoscience degrees and about 140 graduate degree geoscience candidates, Pope said.


VISKUPIC


POPE


MOSHER

Industry Downsizing

What's knocked the props out a little from beneath petroleum geoscience education isn't a lack of student enrollment, but a cutback in student-support funding by oil and gas companies.

"We've definitely seen a decrease in the number of internships, and also the number of fellowships," Pope said.

Following the recent decline in industry activity and spending, Texas A&M saw its geoscience fellowships dwindle from 20 to just eight, he said.

Other universities also report cutbacks in student support by the industry. Especially hard-hit are advanced-degree programs where companies have reduced or completely eliminated subsidies for employees' continued education.

Sharon Mosher, dean of the Jackson School of Geosciences at the University of Texas-Austin, said the program "is still at overcapacity, but demand is down."

"We get a fair amount of funding from industry. Because funding is down, we're bringing in fewer students. But it's not a significant difference," she said.

While the school hasn't yet seen a decrease in applicants for its undergraduate geoscience program, Mosher thinks the numbers will begin to fall off if the industry slump continues.

Diversification

An interesting trend at both Texas A&M and the University of Texas is the number of students moving away from geology-only studies.

"Last year, we had almost as many geophysics majors as geology majors. That seems to have been a one-semester blip for us, but it was a big semester," Pope said.

Mosher said she has seen a shift toward her university's combination petroleum engineering-geoscience degree.

And unlike previous downturn cycles, Texas A&M hasn't experienced an influx of former employees going back to school to upgrade their academic resumes, Pope said.

"One thing we found is that we thought we would be flooded with applications, especially in graduate school. But we haven't been," he noted.

If that means former employees are abandoning work in oil and gas, it could be an ominous sign for the industry, already facing a raft of retirements as pre-1985 hires continue to leave the workforce. (See related story on page 8.

Trends in Geoscience Education

Numerous sessions on geoscience education took place at the second annual Earth Educators' Rendezvous, held in July at the University of Wisconsin-Madison, and more papers on the subject will be presented at the Geological Society of America's annual meeting in Denver in September.

Karen Viskupic, a research professor in the Department of Geology at Boise State University in Boise, Idaho, served as a co-chair for the Rendezvous event.

She said important topics at the meeting included encouraging diversity in the geoscience student population and getting geosocience classrooms to be more active than passive.

"Also, I think, connecting learning in the geosciences to social issues, all of the things society is trying to figure out going forward – There's a lot of new curricula being developed now that takes best practices and sort of wraps that around social issues," Viskupic observed.

Key program themes at the Rendezvous included:

- Diversity, especially in getting women and minorities more involved in geoscience studies.
- Curriculum design and effectiveness, and identifying the most promising trends in geoscience education.
- Geo-competencies – the specific skills directly relevant to geoscience.
- Teacher and instructor training – "how to do it and feel comfortable," as Viskupic described it.
- Integration of geoscience with social issues, and also with other disciplines.

Integrating geoscience with other areas of study involves using geoscience concepts to address problems, Viskupic explained.

"How could we have students in an economics class or a political science class learn something about geoscience?" she said.

Another trend in geoscience education is research into how geoscience students learn, Viskupic said. For example, "what are the best ways to improve spatial thinking? How does that learning develop in students?" she said.

Mosher has worked with the National Science Foundation-sponsored Future of Undergraduate Geoscience Education

See **Summit**, page 14

Getting Serious About Diversity in Geoscience

By DAVID BROWN, EXPLORER Correspondent

For the past decade, educators have made a serious effort to get minority, female and non-traditional students involved in science, technology, engineering and mathematics (STEM). Today that effort has intensified because of a combination of impetus from industry, research in geoscience education and societal changes.

Attempts to attract more minority and female students to science studies have gone "generally well," according to Eric Riggs, associate dean of graduate affairs and diversity for the College of Geosciences at Texas A&M University in College Station, Texas.

"There has been significant investment, by the National Science Foundation in particular. The needle has moved," he said.

Riggs is the immediate past president of the American Geosciences Institute, a former president of the National Association of Geoscience Teachers and will continue as a member of the AGI board of directors until later this year.

While the number of minority and female students seeking STEM-related degrees has increased, geoscience educators are searching for ways to reach truly representative levels of participation.

"The percentage of women in all university geoscience programs, undergraduate and graduate has come up to about 40 percent and stayed stubbornly flat," Riggs noted.

And educators are also searching for ways to encourage minorities, women and non-traditional students to reach for advanced degrees in the geosciences.

Karen Viskupic is a research professor in the Department of Geology at Boise State University in Boise, Idaho. She received her undergraduate degree from Washington University in St. Louis, then went on to earn a doctorate in geology from the Massachusetts Institute of Technology.

"I would say I needed a lot of encouragement from my undergraduate instructors. It wasn't on my radar screen as a junior," Viskupic said.

Seeing What Works

Special programs in many university geology and geoscience departments seek to attract more incoming students in the "minority and other" category.

Sharon Mosher, dean of the Jackson School of Geosciences at the University of Texas-Austin, said the school has made a special effort to attract minority and non-traditional students with a program that started in 2005.

"We have a program, GeoFORCE, that is dominantly funded by the oil and gas industry," she said. "We take students on geology field trips in the summer during their high school years. It's been extremely successful."

GeoFORCE largely draws from inner-city students and students in southwest Texas – "the Eagle Ford area," Mosher noted. The program takes about 600 high school students on geological field trips in Texas and throughout the United States.

University faculty, research scientists, other educators and professional geologists from industry partners lead the outings.

Students who have taken part in the program have a 100-percent high school graduation rate. "That's unheard of," Mosher said – and about two-thirds go on to pursue STEM-related degrees in college.

"There are success stories," Riggs said. "There are programs that have been very focused. Right now we are trying to understand why some programs are more successful than others."

"We're trying deliberately to understand what's working, but we have a ways to go," he added.

Those efforts are targeted at identifying the specific steps and actions educators can take to attract more minority and female students to degree programs, retain them as students and help them earn degrees.

"What can a college do? What can a university do? What can an individual faculty member do?" Riggs said.

Preparing for the Great Crew Change

In one sense, it's easy to understand why industry in general supports the effort to attract students to STEM-related degrees. A technologically-oriented society can't afford to have minorities and women take up science and engineering at disproportionately low percentage rates.

"Having a workforce that is diverse, and also highly skilled at communicating with diverse communities around the world, is essential. We need the talent pool," Riggs said.

For the oil and gas industry, the need to attract minority and female scientists is probably even more acute. Faced with a flood of retirements and some evidence that former employees are abandoning the industry, meeting future staffing level requirements could be challenging.

Non-traditional students may be single parents, employed full time, physically limited, older, veterans who have completed their service, or have other qualities that set them apart from the typical student population. Geoscience education programs try to accommodate and encourage those students.

See **Standards**, page 14

ACE Calgary Delivers 'Petroleum Geology Renaissance'

By BRIAN ERVIN, EXPLORER Managing Editor

Despite dour industry conditions and low expectations from some corners, AAPG's 2016 Annual Convention and Exhibition in Calgary, Canada, saw a strong turnout and high acclaim for what was, by all accounts, a monumental technical program.

"I know this sounds counter to many of our Members' personal experience but I think we are entering into a period of renaissance for petroleum geology," Paul MacKay, president and CEO of Calgary-based Shale Petroleum and general chair for AAPG's 2016 ACE, told the EXPLORER.

"I believe this conference was a watershed moment that showed all of us that we can contribute to our science in a meaningful way, remain engaged, keep our intellectual curiosity and continue to grow even when employment opportunities are less than what we have become accustomed to," he added.

The event was June 19-22 at the BMO Centre and it saw a turnout of almost 4,300 people from all over the world.

The extraordinarily high quality of this year's technical talks was one of the most commented upon features of this year's ACE.

"The technical session was very well received due to the fact that we had the highest number of submissions with a very high review score," said MacKay. "This year we had more than 1,800 submissions and space for approximately 900 talks and posters."

"As a result the acceptance bar was exceptionally high," he added.

One might assume the high number of submissions was precisely because of the downturn – presenting at ACE is great way to enhance a resume and stand out from the crowd in a highly competitive, barren job market.

MacKay has a different theory, though.

"There was likely some of this going on but it does not explain the early rush to submit that we experienced nor explain the very high level of quality that

Continued on next page

Continued from previous page

we experienced," he said.

MacKay pointed out that while interest in the industry most definitely saw a sharp increase when prices were high, there was no corresponding loss of fervor among geologists when the price plummeted.

"My personal feeling is that geologists truly enjoy their profession. For many of our Members, geology is a passion rather than simply a profession," he said. "We are in both a difficult time of less employment but a wonderful stage of having time to follow the passion of geology. In other words, we have a dedicated and able membership that can begin to chase the ideas that have fostered for the past decade."

"AAPG has responded to this latest slow-down in a very meaningful way by making the technical session affordable to those who are without a steady income, as well as raising the technical standards," MacKay added. "This is what good organizations do – they help their membership reach new levels. I believe that we will recover, there is a human cost to these downturns but AAPG has decided to stand with their membership and deliver an excellent technical show."

"It was an honor to be a part of an incredible week," he added.

Next year's ACE promises to be even bigger, with AAPG's 100th anniversary in 2017. It will be April 2-5 at Houston's George R. Brown Convention Center. The Call for Abstracts is open and industry professionals, academics and students are invited to submit their abstracts now that relate to any of the themes listed at ACE.AAPG.org/2017. Exhibition space and sponsorship opportunities for the centennial ACE 2017 are also available.

UTEP Beats Stiff Competition for IBA Win

By BARRY FRIEDMAN, EXPLORER Correspondent

"This win is a testament to the wonderful UTEP students who year after year put in the long hours and frustrations of putting together a major research project and presentation in eight weeks."

That's Richard "Rip" Langford, professor of the University of Texas at El Paso's Department of Geological Sciences.

He's talking about the department's Imperial Barrel Award (IBA) first-place finish that was announced at AAPG's Annual Convention and Exhibition held this year in Calgary, Canada.

Other finalists were the teams from Penn State University and the Colorado School of Mines, who won second and third place, respectively.

Winning Mindset

Mostly, though, Langford is talking about a mindset – about all the intangibles of bringing a group of students together for such a project.

As its faculty adviser, Langford knows firsthand what that takes.

"Our students are exceptionally hard working," he said, speaking of team members Andy Anderson, Andre Llanos, Alan Vennemann, Eric Bergersen and Patrick Rea. "They sacrifice two months before the sectional meeting or IBA. They fall behind in their other classes and delay their thesis research."

This last point is an important one, which can be an impediment to such endeavors.

"We could not participate as often as we have without the support of our faculty who allow students leeway while they are working on IBA," he said.

And work they did.

"We set up two times during the week when all of them could get together to meet and practice. The rest of the time, they lived in a classroom that we have instrumented with three computers networked into Petrel," he recounted.

One would assume he's being hyperbolic on the "lived in a classroom" statement and they were permitted to go home to sleep, but it's tough to know, for this is serious business for serious students. His directions to them – and he insists this is their operation – were simple.

"I just tell them to come up with a team and let them know that teamwork and presentation skills are as important as their technical skills," he said.

To that end, there is no hierarchy. It's communal. There are no "go-to" students, no superstars.

"I look at this primarily as an educational opportunity, rather than a competition, so one of my few rules is that every student has to do everything," said Langford, which means that, while one student might be studying the tectonic setting, stratigraphy or regional production, others will have to correlate at least one set of faults and create a framework of seismic horizons.

"Each student in turn performs a log-to-seismic correlation and converts the volume from time to depth. So, typically, two or three students are madly correlating seismic horizons in the lab, while the others split up to research everything from depth/porosity-trends to known maturation from nearby fields, or studies core information provided in the dataset to determine potential reservoir."

Playing in the Big League

While its reputation is not often mentioned in the same breath with other heavy-hitters among Texas schools, like the University of Texas at Austin and Texas A&M, UTEP's Department of Geological Studies is quite comfortable on the big stage.

"We have been to the IBA finals five times," Langford said, "and have gotten familiar with the 'big leagues.'"

UTEP's Department of Geological Sciences, in fact, is more than 102 years old and was originally named the Texas College of Mines. It presently has 20 faculty members and 150 undergraduate students along with 50 masters and 25 doctoral candidates.

This was the school's ninth year in competition, and its first win, coming out of the Southwest Section, which includes Baylor University, Sul Ross State University, Texas Christian University, Texas Tech University, University of Texas at Arlington and the University of Texas at Dallas.

In the first years of the competition, there were only one or two schools competing, which Langford admits helped to fill the trophy case at the school.

Now, he said, things have changed.

"The Southwest Section has done an amazing job at promoting the IBA and this year most of the schools in the section were competing," he said. "I think the competition in the section is as tough as in the finals now."

See **Opportunity**, page 14

AAPG Imperial Barrel Award 2016

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Summit
from page 6

Summit. As part of that effort, more than 100 academic leaders identified skills and competencies that need to be developed in geoscience students, then industry input "added granularity" to the list, she said.

At GSA2016 in Denver, presentation topics will include K-12 geoscience education, technological innovation in geoscience instruction, earth science and creativity, and geoscience data resources.

The topic "Incorporating Field Experiences and Project-Based Learning into the Geoscience Classroom" reflects current thinking in geoscience education about the importance of fieldwork, lab work and hands-on discovery.

"We're trying to build so students can actually show more of what they do when they leave here," Pope said.

Pope said his department aims for what it calls a "high-impact learning experience," with students getting plenty of attention from professors and instructors.

"Usually the classes are small, so the students get a lot of experience with the faculty members or with the graduate students," he said.

Getting students into the field to do research is another key component of the experience, "or to get them into the lab. It doesn't have to be in the field," Pope added.

The Jackson School of Geosciences also makes sure undergraduates have plenty of time to interact with faculty members, grad students and specialists, Mosher said.

"You aren't just mentoring them," she noted. "You're getting them involved in creating and doing."

Opportunity
from page 12

Opportunities and Rewards

As to the competition itself and the datasets provided, due to their proprietary nature (they are provided by a variety of companies to AAPG), Langford can't go into specifics.

"I can just tell you our dataset was in the Barents Sea. AAPG selects and distributes the datasets in January. Dataset distribution marks the beginning of IBA. Before this, you have no idea what part of the world you might be studying," he said.

He will say, however, that the datasets provided give the students opportunities to work with most types of real world data.

"It gives a tremendous opportunity for our students to analyze and integrate the wide variety of data used in industry," said Langford.

And he was amazed by what they brought him.

"Perhaps the key turning point," he said – the moment he knew it was a special year, "was when the students presented me their prospects. At first I didn't believe they had closure and made them carefully outline their traps and explain why they thought they had seals. They had the confidence to stick to their guns and I think it showed in their presentation."

The award comes with a $20,000 prize, which will be plowed back into the operation.

"We have set up an account to be used by our students, with the IBA teams getting first dibs," said Langford.

"In the past we have used our winnings to send students to short courses, arranged for software training and gone on rig trips. With this enhanced funding, we may provide some small scholarships and try to expand our IBA computational facilities," Langford said.

Which means you can probably expect to see more UTEP students posing with IBA trophies and giant checks in the years to come.

Standard
from page 8

For encouraging minority and female students, a key concept in college-level geoscience education is to have more minority and female professors in tenured and leadership positions.

"Standards are never lowered. You don't get yourself anywhere by lowering standards. There are capable people that reflect all components of our society," Riggs said.

Texas A&M is actively working to get minority and female faculty in more prominent, and more visible, positions, according to Mike Pope, head of the Department of Geology and Geophysics at Texas A&M University in College Station.

"I know we're having a trend in trying to hire more women as faculty members," he said. "We don't have a lot of role models in tenured faculty members who are women."

In recent years, a few researchers have criticized the push to attract more students to STEM-related degrees. One observation is that a STEM degree does not lead directly to employment in a technical field, or guarantee a high salary or an uninterrupted professional career.

A significant number of former employees of the worldwide oil and gas industry can attest to that last point.

But any university degree, even an advanced degree, can't guarantee a career path for an individual. Supporters of the STEM approach say literacy in science and technology is essential to contemporary society, which requires the "talent pool" mentioned by Riggs.

A stronger effort to attract minority, female and non-traditional students isn't the only story in geoscience today. Geoscience education research has flourished and is beginning to produce impressive results, Riggs said.

"You actually have people presenting programs on this instead of just saying what they think will work. That's an exciting trend," he observed.

"It's refreshing to see this growing organically out of the geoscience education community," Riggs said. "Even the petroleum industry is starting to research how expert-level specialists learn. It's an exciting time."

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See You Next Year! #URTeC2017

Students enjoy a field trip led by a visiting geoscientist in their area. This is just one of the many ways that people get involved in Earth Science Week.

Earth Science Week Celebrates 'Our Shared Geoheritage'

By KELSY TAYLOR, EXPLORER News Editor

"Our Shared Geoheritage" is the theme of this year's Earth Science Week, an annual worldwide celebration to be held Oct. 9-15.

The celebration highlights the importance of geoscience education by organizing a variety of activities to promote learning and to spark interest in the field.

This year's theme will focus on the collection of natural wonders, landforms and resources that have formed over time along with the need to conserve and manage them effectively.

"Everyone has something to share and everyone has something to learn," said Geoffrey Camphire, outreach programs manager for the American Geosciences Institute, which coordinates the event with support from the AAPG Foundation, U.S. Geological Survey, NASA, U.S. National Park Service, ExxonMobil, Esri and others.

The Days of Earth Science Week

Each day of the week will focus on a specific aspect of geoscience:

- International Earthcache Day encourages the hobby of geocaching around the world.
- Earth Science Literacy Day shares the fundamentals of geosciences through a video series.
- Earth Observation Day introduces students to remote sensing, an exciting educational tool.
- National Fossil Day promotes paleontology and the appreciation of fossils around the country.
- Geoscience for Everyone Day welcomes underrepresented communities to discover geoscience career opportunities.
- Geologic Map Day highlights the importance of geologic mapping in education, science, business and policy.
- International Archaeology Day celebrates archaeology and the thrill of discovery.

Throughout the week, teachers will have the opportunity to invite geoscientists to visit their classrooms, which is an exciting way for students to learn more about the earth from the best-qualified mentors. Many lead field trips to interesting geological sites in their area so students can have a hands-on approach to learning. Others arrange fun and educational activities for students to do in the classroom.

"Geoscientists of all stripes have something so unique to pass along to young people," said Camphire.

"When they share their expertise, they light a fire of curiosity, exploration and inspiration. And they know it, because they're igniting the same fascination with science that awakened in them when they were young," he added.

Another way to get involved in the celebration is to enter one of the many contests planned for Earth Science Week.

"The contests offer fun ways for students and others to stretch their brains, explore geoscience and compete for prizes," said Camphire.

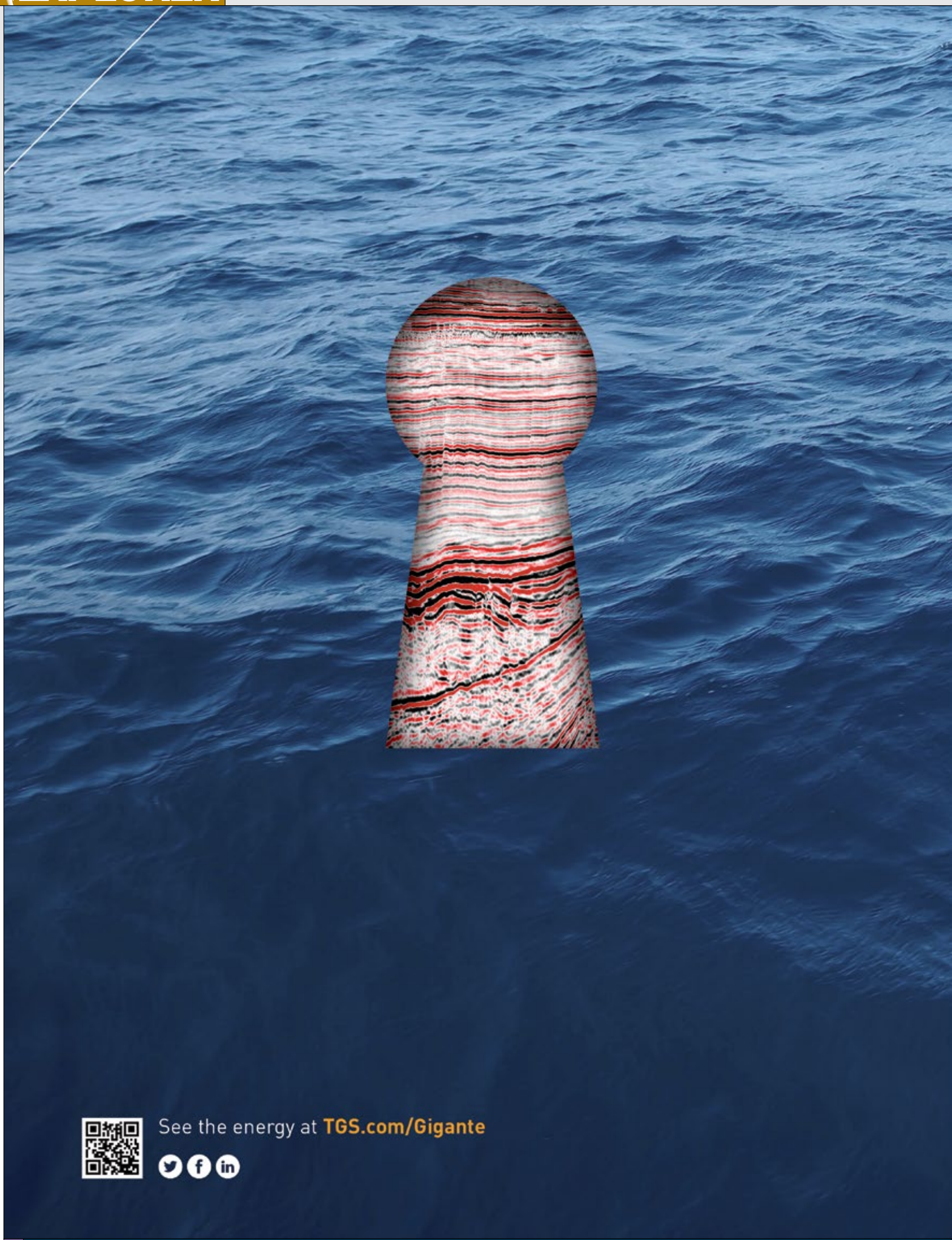
The video contest is open to students and teachers. It challenges teams to work together to share about an outdoor place that is special to them.

The photography contest is open to everyone and will feature photographs that show how earth systems have interacted over time to form geoheritage in a community.

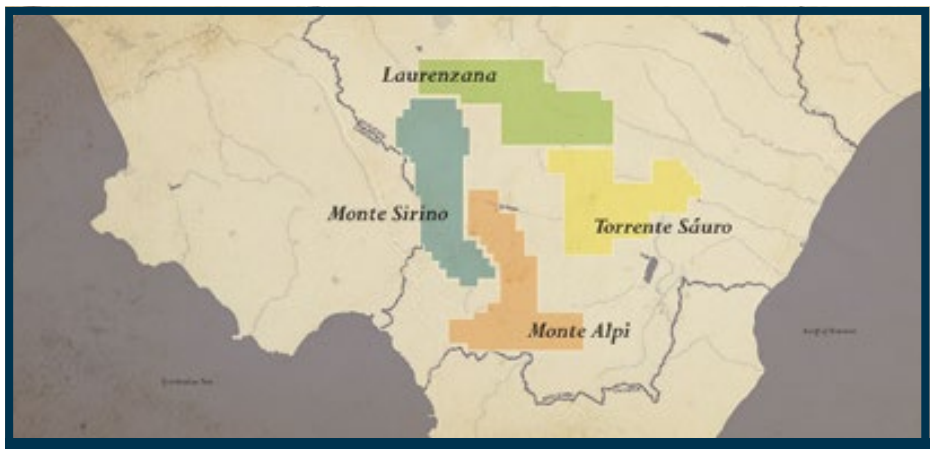
The visual arts contest will set out to show how earth systems have shaped the world. It's open to students in kindergarten through fifth grade.

And lastly, the essay contest will have students in sixth through ninth grade research and write about the process of choosing geoheritage sites.

To learn more about Earth Science Week, visit www.earthsciweek.org. Also, look for a poster promoting Earth Science Week inserted in the September EXPLORER sent to U.S. addresses.


See the energy at TGS.com/Gigante

Historical Highlights is an ongoing EXPLORER series that celebrates the "eureka" moments of petroleum geology, the rise of key concepts, the discoveries that made a difference, the perseverance and ingenuity of our colleagues – and/or their luck! – through stories that emphasize the anecdotes, the good yarns and the human interest side of our E&P profession. If you have such a story – and who doesn't? – and you'd like to share it with your fellow AAPG Members, contact Hans Krause at historical.highlights@yahoo.com.



Location of Southern Apennines permits


Southern Apennines well location

Discovery of the Giant Monte Alpi Field

By IAIN PATERSON and CHRIS BROWN

A relatively unknown and highly productive oil province in Europe was discovered by a British national oil company, all because they were told to stay close to home.

A newly created international team at Enterprise Oil, unencumbered by operatorship, was able to piece together the seemingly complex geology of the Southern Apennines. The team also postulated a new, simpler geological model, playing a significant role in proving up the significance of the area as a major hydrocarbon producing province.

The British government created Enterprise Oil in 1983 when the oil producing assets located in the UK sector of the North Sea (controlled by then state-owned British Gas) were bundled up in this new company. Enterprise was floated on the London Stock Exchange in May 1984.

The company's assets were, therefore, entirely in the UK. The newly created board decided they wanted Enterprise to develop into a geographically diversified E&P company and they set about creating a team to expand internationally. CEO Graham Hearne had a very clear idea of where the international team should and shouldn't focus its efforts, and no amount of reasons why more distant prospects like West Africa might be a good bet would persuade him.

"No," he said. "You can go anywhere in the world you like, provided that you can get there and back on the same day."

Scouting Possibilities

That gave the team its parameters and they set about looking at the hydrocarbon provinces in western Europe other than the North Sea. The Paris Basin was one possibility, but another was Italy, where a number of small discoveries had been made in the Adriatic and nearby onshore. The Po Valley was completely closed to anyone other than Agip (now Eni) at that time.

The small international team – and it was small – began lengthy discussions over lunch with Fina and Total, who had offices in Milan and Rome, respectively.

In 1985, Enterprise farmed into its first acreage in the Southern Apennine Mountains, taking interest from Fina and Total in the eastern trend acreage of Laurenzana and Torrente Sauro.

Meanwhile, Enterprise had a program of introducing itself to the larger operators active in the North Sea. One such operator was Agip, who had heard of Enterprise's interest in acquiring acreage in Italy. They took one look at this smallish upstart and suggested Enterprise deal with its 100-percent subsidiary Petrex, which was formed to pursue minor opportunities in Italy.

Thus began a long relationship with Carlo Viotti, who was at that time the exploration manager of Petrex. Discussions became even more extensive and negotiations were very civilized with Franco Borromeo, the commercial manager of Petrex and a member of the great, historic Borromeo family.

The first Italian farm-in with the most significance for this story was in May of 1987 when Enterprise took a 15-percent interest in the Monte Sirino permit and a 20-percent interest in the Monte Alpi permit in the Apennine from Petrex. Both permits were located within the northwest to southeast Apennines foothills trend where reverse fault bounded anticlines with Apulian platform carbonates (Late Cretaceous-Miocene) reservoirs comprise the principal objective.

Enterprise postulated that the Apulian platform is probably largely in its depositional position, having been uplifted and faulted during late Pliocene and Quaternary compression (autochthonous model) and not, as was widely believed at the time, the product of long distance over thrusting (allochthonous model). The Lagonegro Triassic-Jurassic basinal sediments separated the Apulian platform from a smaller carbonate platform to the west. These were together thrust over the leading edge of the Apulian during the same compressive phase.

The Monte Alpi and Monte Sirino permits were located within two kilometers of the Caldarosa and Costa Molina oil discoveries. Agip drilled both discovery wells.

Costa Molina, which was completed in 1983, flowed with 21-degree API oil from Apulian carbonates at a sustained rate of 500 bopd.

The Caldarosa discovery well was completed toward the end of 1986. At that time there were rumors of significant flow rates and that the oil at 26-degrees API was significantly lighter than Costa Molina. The reservoir in both discoveries is at a depth of around 3,750 meters, significantly deeper than the objectives in Monte Alpi and Monte Sirino.

Before agreeing to the farm-in, the team led by Chris Brown, Ivan Inchenko and Jane Dyer carried a field exercise and were particularly interested in the old Tramutola field in the central part of the Monte Sirino permit, where oil was still seeping out of the ground.

Oil and gas had been produced from fractured carbonates and shales in the field until production ceased after bombing in 1943. The reservoir is shallow (300-500 meters) and it is likely that the fractured and karstified carbonate is juxtaposed against deepwater shales and finely crystalline carbonates of the Lagonegro. The source was believed to be of Cenomanian-Turonian age.

Discovery

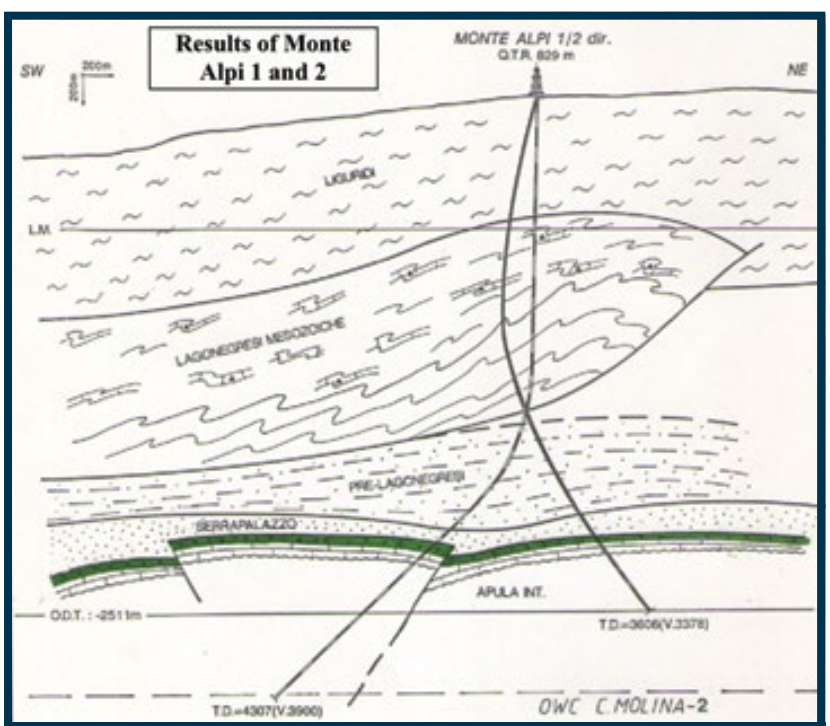
The first well was spudded on the Monte Alpi permit in late 1987 and Enterprise opened its office in Rome in

Continued on next page


PATERSON

Iain Paterson has more than 45 years of experience in the oil industry. After graduating from Cambridge and Durham universities, he began his career with BP as a geophysicist and served in Abu Dhabi, Iran, the United States and the United Kingdom. He joined Enterprise Oil in 1984 to create the team and to lead the international expansion of the company, and became a main board director for international and exploration in 1992. After leaving Enterprise in 1998, he has followed a portfolio career holding a number of posts as either chairman or non-executive director in both public and private companies, most of whom have had a significant involvement in the energy business. These have included MOL Nyrt, Hunting, ITE Group, Paladin Resources and Sondex. He is currently a director of Enteq Upstream.

Monte Alpi giant oil field



Monte Alpi section

Continued from previous page

early 1988. It was on Good Friday that year and Brown was just setting out for a long weekend of skiing in the Central Apennines with his family when he got a call from Rome to inform him that Monte Alpi-1 had flowed the equivalent of around 1,000 bopd of light oil.

Carlo Viotti later joined Enterprise as the general manager of the Rome office.

The following year, 1989, the Tempa Rossa-1 discovery was made in the adjacent Laurenzana permit where Enterprise had a 15-percent interest.

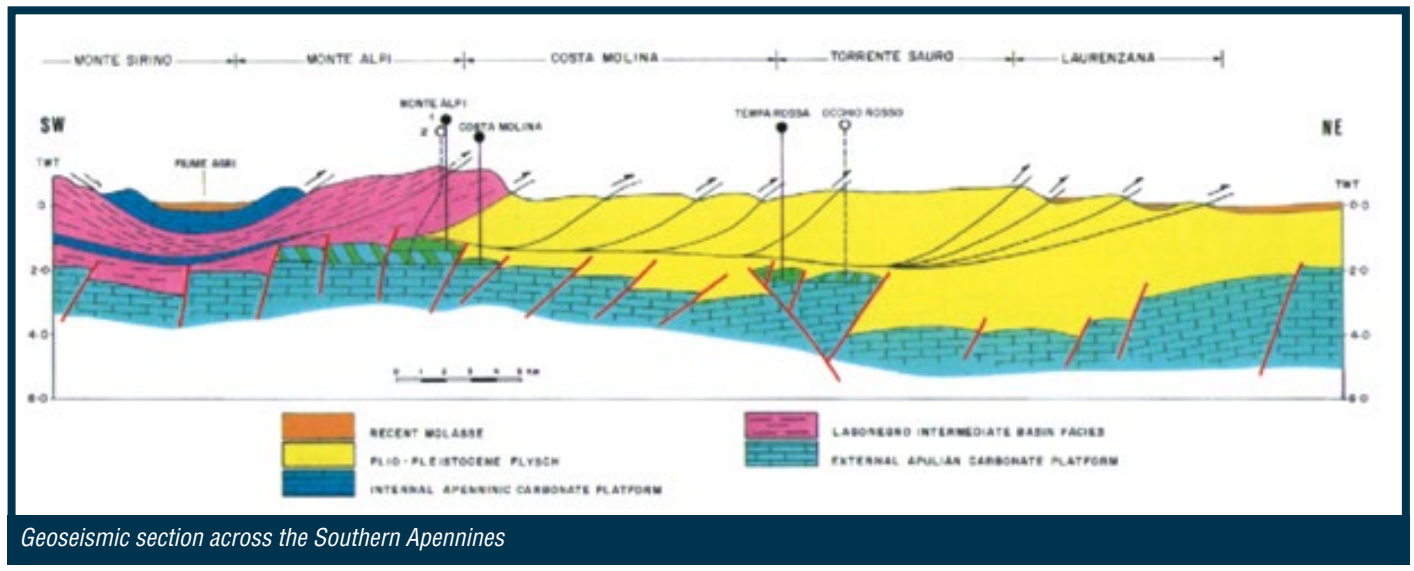
This was a heavy oil discovery but it helped to build the picture of an exciting oil province and allowed the modeling of the distribution of API gravity.

By now, Enterprise had an understanding of the potential of the oil play in the Southern Apennines by bringing together the skills of geological fieldwork, geophysics with structural modeling, petrophysics and geochemistry.

These data were combined and led to the team putting forward in 1990 the concept of the "Giant Monte Alpi" field with potential reserves of 600 mmb recoverable. This was on the same scale as the North Sea Nelson discovery made by Enterprise two years earlier.

On the back of this perceived potential, Enterprise increased its stake in the Monte Sirino permit to 35 percent that same year.

The pivotal year was 1991 when Monte Alpi-2 was drilled to test the theory that Costa Molina-1 and Monte Alpi-1 were effectively the same structure with the same oil-water contact. Monte Alpi-2 penetrated a 1,100-meter oil column in the Apulian carbonates with excellent vuggy porosity and found the said oil-water contact. The oil was light (about 40-degrees API) and the column was supported by fresh water believed to have originally fallen as rain on the outcropping Apulian carbonates some 150 kilometers to the east.



Geoseismic section across the Southern Apennines

BROWN

Chris Brown graduated with a master's from Imperial College in 1979 and has been a member of AAPG since 1980. His career has seen him working for Shell International, Enterprise Oil, Petro-Canada and Aurelian. In 2011, Chris formed Silurian Consulting and has worked for a number of smaller companies. Chris is currently business development director for Beagle Geoscience and founder and chief technical officer for Blue Gate Energy.

Also that year, the Tempa Rossa-2 discovery was made in the neighboring Torrente Sauro permit where Enterprise had a 20-percent interest.

In 1992, Enterprise was able to increase its interests again in the Southern Apennines by acquiring the TransCanada Pipelines Limited share. As a result, the Enterprise interests became 40 percent in Monte Alpi and 55 percent in Monte Sirino. In that year, the Cerro Falcone-1 discovery was made in the Monte Sirino permit and the two permits were converted into the Grumento Nova and the Volturino Concessions to allow appraisal and development operations. Agip (Eni) assumed operatorship.

The appraisal drilling confirmed the presence of the giant Monte Alpi field as first suggested by Enterprise.

Production commenced in 1996. Up to the end of 2014, the complex of fields had produced 460 mmboe, according to IHS. Shell bought Enterprise Oil in 2002 and the complex of fields were unified by Eni and Shell to form the Val d'Agri field that currently produces about 85,000 bopd, also according to IHS.

In 2012, Total announced that it would proceed with the development of the Tempa Rossa field with first oil projected in 2016. Peak production will be 50,000 bopd from a field thought to contain some 400 mmb.

In 1985, Enterprise was pursuing a strategy of modest international exploration expansion but restricted by Graham Hearne's instruction not to go further afield than a lunch engagement.

Little did anyone realize that there was at least one billion barrels to be discovered onshore Europe and that Enterprise could obtain a significant chunk of that.

‘Great Crew Change’ Drives Energy School Growth

By KRISTI EATON, EXPLORER Correspondent

In the past few years, a wave of schools geared to training students in science and mathematics in the hope of creating the next generation of oil and gas professionals have popped up in several oil-producing states.

Oil and gas-related jobs have been in steep decline since the downturn, but administrators at these schools say the downturn is not affecting their mission, since there will always be a need for skilled workers with a STEM-based education.

Energy students from Energy Institute High School compete at the Shell STEM Showdown to see who can create the strongest tower to withstand an earthquake. Photo courtesy of Energy Institute High School.

Vision

“Despite the current conditions in the industry, our vision remains the same,” said Eric Sampson, director of the Utica Shale Academy in Salineville, Ohio. “We want to prepare students for employment or further education in the oil and gas industry.”

The Utica Shale Academy opened in 2014 as a tuition-free publicly-funded high school and allows students to earn a diploma as well as oil and gas-related skills certifications. Students learn about the upstream and downstream operations of the petroleum industry and also have the opportunity to earn college credit. The academy has expanded to two sites, with 72 students, Sampson said, with plans to expand to other Utica Shale play hotspots.

“Our location is a prime area for the Utica Shale play,” he said, noting that steel mills were at one time the main labor market in the area. “As those opportunities waned, coal became a large employer. Over time, that too has dwindled. The oil and gas industry has become one of the largest employers in our area with the potential for long-term employment.”

According to the school, Ohio employs more than 178,000 people in the oil and gas industry, accounting for $798 million in salaries annually.

Continued Growth

In Texas, more than 550 students in grades nine through 11 are enrolled at the Energy Institute High School in Houston. The school, which opened in 2013, has added a grade level each year and has expanded to include 800 students, said Noelle MacGregor, dean of students.

The school is also expected to open a $37 million permanent facility in the fall of 2017 that will feature various energy and science labs throughout the building as well as outdoor learning spaces, MacGregor said.

“The new building will be designed with the energy industry and project-based learning in mind,” she added.

The current downturn within the industry will not affect the school’s plans for growth, MacGregor said, given the cyclical nature of the industry.

“Energy is not an industry that is going to disappear,” she said. “It will change and evolve over time and we are going to need people to fill those future jobs. Our students will be prepared to take on new challenges in the industry because we focus so heavily on building the 21st century skills necessary to be successful in any career.”

Those skills include teaching students how to think about solving problems and how to develop math and science-based skills. “All of these skills are highly transferrable to many jobs across STEM-career fields,” MacGregor said.

Energy Institute High School is one of five high schools within the Houston and Forth Worth Independent School Districts focusing on engineering, geosciences and leadership. The schools are part of the Independent Petroleum Association of America (IPAA) and the Petroleum Equipment Suppliers Association (PESA) Energy Education Center.

Center for Education

Anne Ford, executive director of the IPAA/PESA Energy Education Center, said the center started with a simple idea almost a decade ago to make

See **Mission**, page 25

AAPG Education Upcoming Education Events 2016

AAPG HEDBERG RESEARCH CONFERENCE CENTER

Mudstone Diagenesis: Implications for Exploration and Development of Unconventional Reservoirs

16-19 October 2016 | Santa Fe, New Mexico

The purpose of this conference is to foster the free exchange of new ideas among leading experts from industry, academia and government on the controls and impacts of inorganic and organic diagenesis on mudstone hydrocarbon generation, reservoir properties and seal quality.

Until recently, most researchers investigating shales concentrated their research efforts towards understanding: (a) hydrocarbon generation and expulsion, (b) seal capacity and (c) overpressure generation. Most data used to support these investigations were derived from organic geochemistry, relatively low magnification optical petrography and bulk rock characterizations. Notably lacking from these studies is the characterization and evaluation of the potential impact of mudstone diagenesis.

New analytical techniques in scanning electron microscopy (SEM) have allowed the investigation of mudstone properties down to the nanometer scale. New SEM observations of mudstone micro-texture have revealed the presence of authigenic cements, and have captured various stages of the transformation of organic matter during petroleum generation. An improved understanding of mudstone organic and inorganic diagenesis is required to advance the ability to better predict shale reservoir quality and heterogeneity.

GEOSCIENCES TECHNOLOGY WORKSHOP

Making Money with Mature Fields - Geosciences Technology Workshop

5-6 October 2016 | Houston, Texas

The goal of this workshop is to review mature fields and to identify the amount and nature of oil that can be recovered, and to evaluate competing strategies for economically producing the remaining reserves. In addition to looking closely at fields, we will review new and improved technologies that may help revitalize reservoirs and overcome problems such as low pressure, paraffin, corrosion and more. We will identify companies willing to offer a "no money down" approach, or other forms of innovative financing. In addition to reviewing the technology, we will review case studies.

Themes

- Mature fields: examples and profiles
- Typical issues resulting in oil left behind
- EOR
- New technologies and techniques
- Is there funding? Where? How? Who?
- Reality checks: water, environmental issues, infrastructure
- Opportunities and economies of scale: how to make the economics really work

E-SYMPOSIA AND ONLINE COURSES

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- **Strategic Decision-Making: Current Issues in the Oil Industry**
  Learn to critically evaluate current issues that can impact growth and sustainability of oil and gas ventures.
- **Petroleum Exploration & Production: An Online Overview**
  This online course provides an overview of the petroleum industry from what is natural gas and crude oil to how to explore, drill, and produce oil and gas.

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SHORT COURSES

Carbonate Depositional Systems

3-4 October 2016 | Houston, Texas

This course will alternate between lectures and practical exercises involving cores, logs and seismic data.

The course starts with an introductory lecture that summarizes key differences between carbonate and siliciclastic depositional systems, followed by a review of the Dunham classification of carbonate rocks and grain types. An exercise involving outcrop samples will allow participants to describe samples and relate them to depositional environments. The second lecture is on carbonate depositional environments, and it will systematically examine modern environments, outcrop equivalents and subsurface reservoir examples of each environment. An exercise involving cores and logs will illustrate ramp depositional environments and their effect on reservoir architecture during "greenhouse" times.

Carbonate sequence stratigraphy will be discussed in theory and practice. A core-log-seismic exercise will show how predictable variations in reservoir development occur during ice-house cycles on a shelf and isolated platform.

This course will conclude with a discussion summarizing prediction of depositional facies, stratigraphy and reservoir development in a variety of different settings.

The Petroleum Geochemistry Toolkit for Petroleum Exploration and Development

3-4 October 2016 | Houston, Texas

The petroleum geochemist's task is to determine if a regionally extensive source rock is present, if the source rock reached sufficient maturity to generate large volumes of hydrocarbons, what type of hydrocarbons will be generated, timing of peak generation (current or historic), and migration of the generated hydrocarbons (trap access). These petroleum geochemistry elements and processes need to be understood to properly assess risk and high grade play in both conventional and unconventional resource play opportunities.

This course will provide sufficient background to better understand basic principles of petroleum geochemistry, how best to use geochemistry in their exploration or development study area, determine the limitations of geochemical data/interpretation, and types of samples and analysis required to evaluate a basin, region, play or well.

In Conjunction with AAPG | SEG 2016 International Conference & Exhibition (ICE)

ICE SC 08 | Salt Tectonics of the Gulf of Mexico (AAPG)

10-11 September 2016 | Cancun, Mexico

This course is intended for geoscientists, engineers and managers who need an introduction to salt tectonics or an update in this constantly evolving field. It is appropriate for those working in any salt basin globally and assumes a basic familiarity with structural geology concepts and terminology.

This two-day short course will provide an overview of salt tectonics in the Gulf of Mexico (GoM), including both the U.S. and Mexican portions of the basin. It will cover a range of topics from the fundamental mechanics of salt-related deformation to the regional distribution of different structural styles, including relevant aspects of extensional, contractional, vertical and allochthonous salt tectonics. It is intended for geoscientists with different levels of expertise, from those new to the GoM or salt tectonics to those with years of experience in exploring this complex basin.

www.aapg.org/career/training/

The Geophysical Corner is a regular column in the EXPLORER, edited by Satinder Chopra, chief geophysicist for Arcis Seismic Solutions, TGS, Calgary, Canada, and a past AAPG-SEG Joint Distinguished Lecturer.

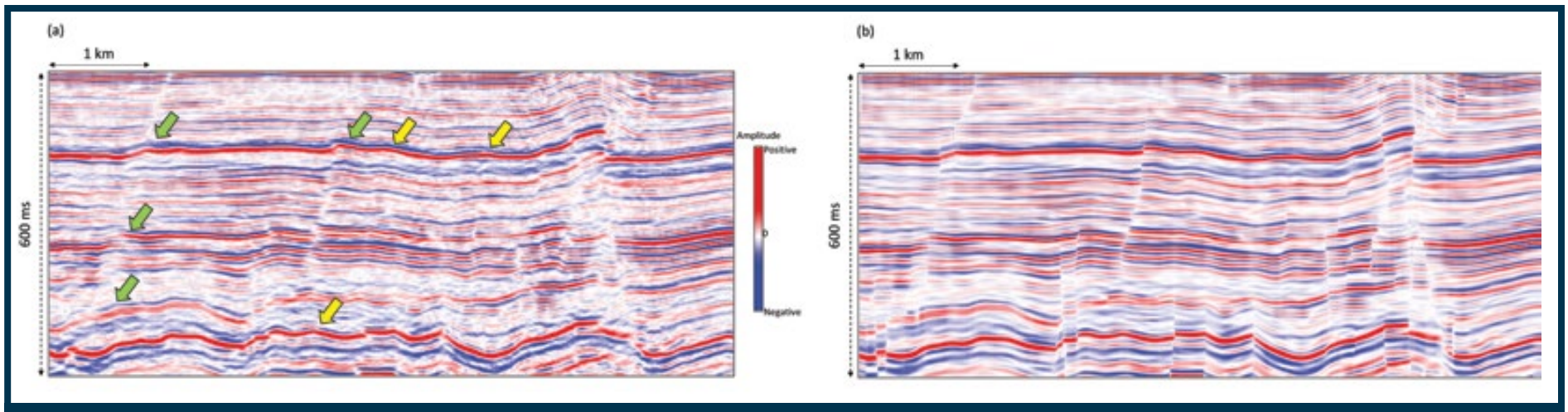

Figure 1: Vertical slices through the seismic amplitude volume (a) before and after (b) two passes of Kuwahara structure-oriented filtering. Notice how cross-cutting noise inconsistent with structural dip is suppressed, amplitudes consistent with structural dip are preserved, while discontinuities are sharpened with filtering. Green arrows indicate the footwall of a fault, while yellow arrows indicate folds that may be associated with pop-up features. Size of analysis window is 5 traces by 11 2-ms samples. (Data courtesy: Arcis Seismic Solutions, TGS, Calgary, Canada)

Volumetric Fault Enhancement Applications

By SATINDER CHOPRA and KURT J. MARFURT

Coherence is an iconic attribute available on most interpretation workstations and it helps with the characterization of small and large-scale faults, large structures, fault truncations, buried channels, reef edges and unconformities. There are various algorithms available for coherence computation, each having its advantages and limitations in terms of the quality of coherence imaging of the features of interest and run times associated with them.


CHOPRA


MARFURT

The quality of the input surface seismic data has a strong bearing on the quality of the coherence attribute generated, and for that matter any attribute that is generated therefrom. Due to operator aliasing, acquisition footprint and other noise, almost all coherence data volumes computed from 3-D land surveys benefit from further conditioning of the input amplitude data. Such data conditioning may include reduction of cross-cutting and random noise, sharpening or enhancement of discontinuities, spectral balancing and interpolation of missing traces.

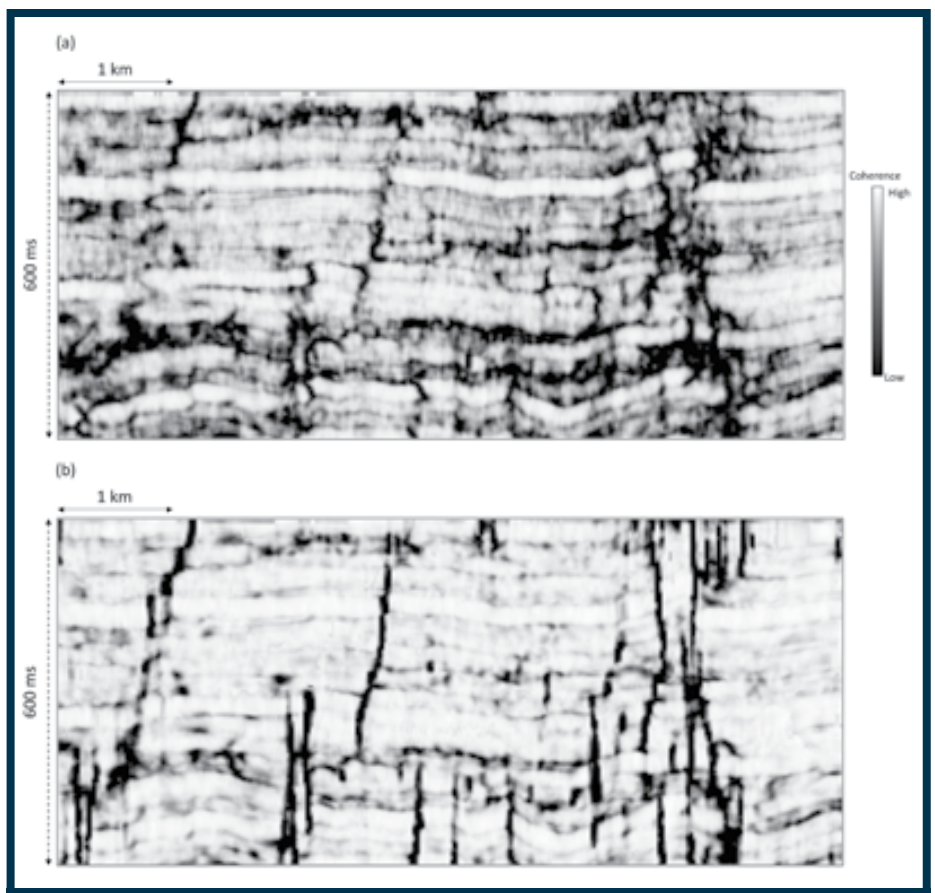

Figure 2: The same vertical slice as shown in figure 1, through the coherence volumes, (a) before, and (b) after data conditioning. The coherence attribute exhibits low values parallel to structure, some of which correlate to unconformities and others which correlate to areas of low signal-to-noise ratio.

In this article, we discuss the enhancement of faults and axial planes of folds by preconditioning of seismic data followed by directional smoothing and edge enhancement, thereby enhancing geological features of interest for effective interpretation.

The authors have discussed in detail the preconditioning of seismic data for attribute generation in the various articles they have published.

Such preconditioning suppresses noise and improves the lateral and vertical resolution of the signal for effective attribute analysis. One of the techniques for reducing noise and edge enhancement of discontinuities is the structure-oriented filtering with Kuwahara sharpening, which preserves the edges by selecting the most coherent patch of data around each sample in the seismic volume. With the use of overlapping windows, the best window can be determined for filtering such that not only the lateral, but vertical resolution can be improved about fault edges.

In figure 1, we show a vertical slice through a 3-D seismic volume from British Columbia, Canada. The seismic data were subjected to two passes of structure-oriented filtering with Kuwahara sharpening. Notice the crisp definition of the faults and the higher signal-to-noise ratio of the filtered amplitude data.

In figure 2, we show the equivalent vertical slices from the energy-ratio coherence attributes generated from the seismic data volumes before and after data conditioning. Notice that the near-vertical low-coherence anomalies corresponding to faults and large fractures are often overprinted by near-horizontal low-coherence anomalies parallel to stratigraphy. While useful for stratigraphic interpretation, these features often interfere with computer-aided fault interpretation.

Edge Enhancement

It is quite common to enhance edges on photographic images with the use of mathematical second derivative "Laplacian of Gaussian" filters. Similar filters have been used to enhance lateral structural and stratigraphic discontinuities in 3-D seismic data. Geological features comprising channels and fault trends seen on sharpened coherence displays are crisper and easier to interpret than they are on equivalent coherence displays without sharpening.

Similar but more focused workflows are now available that design directional filters, skeletonize discontinuities and generate preconditioned volumes for subsequent volumetric fault extraction.

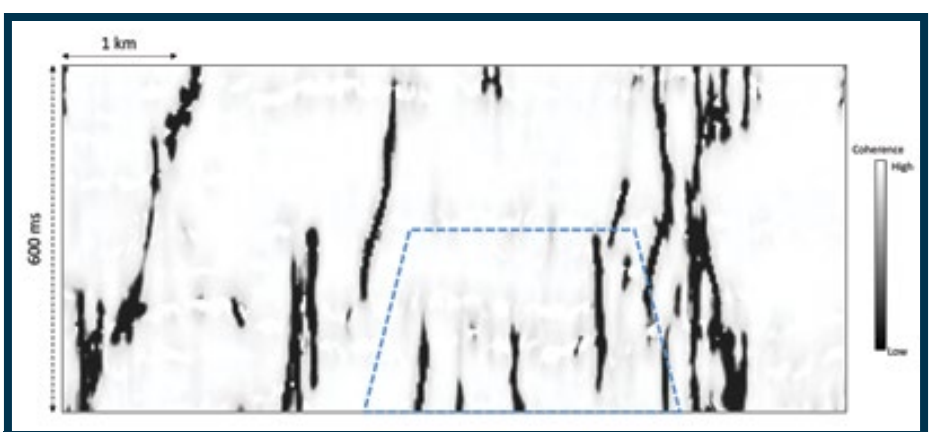

Figure 3: The same vertical slice as shown in figure 1, through the fault probability volume generated with seismic data put through two passes of Kuwahara structure-oriented filtering. The low coherence horizontal striping seen on the displays in figure 2 is now suppressed and the vertical discontinuities are seen clearly.

Fault Likelihood or Probability Attribute

When such preconditioned data are put through the workflow for volumetric fault enhancement mentioned earlier, one of the main attributes generated is the fault probability volume. In figure 3, we show an equivalent section from the fault probability volume, generated for seismic data with two-passes of Kuwahara structure-oriented filtering. Notice how the prominent fault probability lineaments image and align the fault discontinuities, while the smaller ones in the blue highlighted area are not quite well defined.

While the vertical displays shown

Continued on next page

Mission
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mathematics and science more relevant within public schools and to address the aging workforce in the engineering and geoscience fields. The industries are projected to lose 50 percent of their workforce to retirement in the next 10 years, she said. IPAA partnered with PESA in 2012. There are currently 1,225 students enrolled across the five academies.

The center's mission is to introduce students to careers in energy early on – not when they are looking for work – and provide an understanding of what it would be like to work for a petroleum company, Ford noted.

No matter where the price of natural gas falls, there will be a necessary need for a "crew change," Ford said, and that is why it is crucial to expose current and future generations to technology and innovation.

"Tomorrow's energy problems will be solved by today's young people pursuing challenging STEM academic studies and careers and entering the energy industry," Ford said. "Hence, the energy industry continues to invest in today's youth."

In August, the North American Prospect Expo Partners presents a $100,000 donation to the center. The money will help fund the center's guest speaker lectures on teamwork and business, college site visits and industry-related competitions at the five academies, among other things.

Collaboration

Meanwhile, students in North Dakota have the opportunity to learn about the oil and gas industry thanks to a combined effort between the industry and education leaders. The curriculum, called ENERGY: Powered by North Dakota, was launched in 2014 and follows science, social studies and common core standards at the fourth and eighth-grade levels, said Emily McKay, director of the Great Plains Energy Corridor at Bismarck State College's National Energy Center of Excellence.

It's important for students in the state to know about North Dakota's energy resources, McKay said.

"Not only is energy a vital industry and economic engine for our state, it's also a highly tech-advanced and innovative industry," she said. "As students learn about energy in the state, they get excited about STEM."

Students can watch videos of a dragline operator at work, the construction of a wind turbine, time-lapse of drilling and more, and then teachers can link that information to what's happening in the students' backyards, McKay said.

"Even with a downturn in the oil industry, a highly-skilled workforce is still needed for long-term industry jobs," she said. "These are great careers for our students, as they typically pay well and offer opportunities in continuing education and advancement."

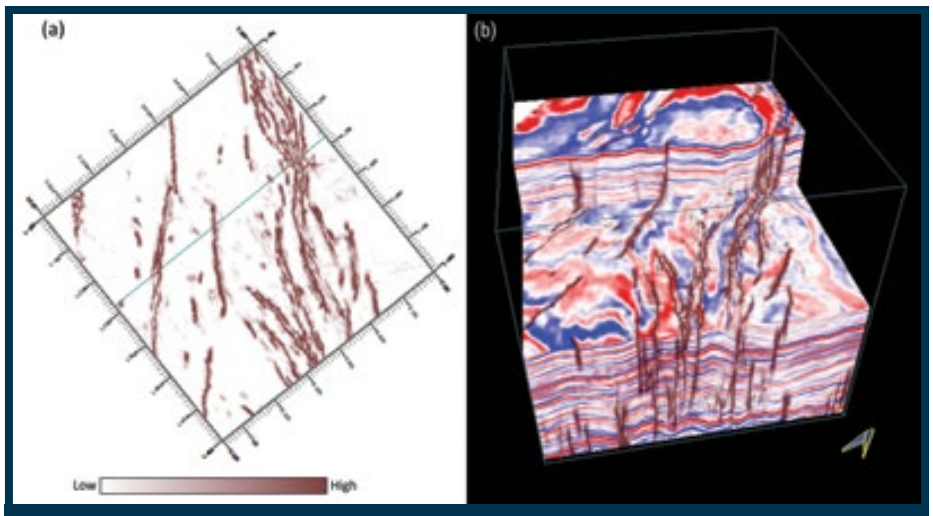

Figure 4: (a) Time slices at t=1300 ms through fault probability volumes computed with two passes of Kuwahara principal component structure-oriented filtering. Discontinuities subparallel to reflector dip have been suppressed. Note the improved continuity and extent of the faults where the fault enhancement algorithm has joined previously disjoint fault segments. (b) The seismic volume co-rendered with the fault probability volume, providing a useful way of carrying out fault interpretation.

Continued from previous page

in the earlier figures convey the value-addition in terms of smoothing and crisp definition of the fault lineaments, in figure 4a we exhibit time slice at *t*=1300 ms from the fault probability volume generated for data with two-passes of Kuwahara structure-oriented filtering. Finally, we display 3-D volume visualization and correlation of the fault probability volume and its co-rendering with 3-D seismic data in figure 4b. Such fault-enhanced visualization facilitates their interpretation.

Conclusions

The volumetric fault image enhancement workflow described earlier provides a means of interpreting fault probability attributes for linear discontinuities. This approach helps in the manual interpretation of faults on workstations, and it provides a useful input for software designed for automatic extraction of fault planes. The methodology followed in this workflow enhances the desired orientation of linear geologic features, and their interpretations can be carried forward to the next step in terms of their correlations with production data.

We wish to thank Arcis Seismic Solutions, TGS, Calgary for permission to present this work.

(Editor's note: Kurt Marfurt is an AAPG Member and professor of geophysics at the University of Oklahoma.)

Giving Students a Competitive Edge

By EMILY SMITH LLINÁS, EXPLORER Correspondent

It's no secret that the current low-price environment makes this a challenging time to enter the energy industry. Highly qualified geoscience students who, five years ago, would have had four or five offers by graduation day now face uncertainty about when and if they will get a job.

The Student Career Seminar held at AAPG's Annual Convention and Exhibition in Calgary, Canada provided students and recent graduates with strategies for finding success, regardless of the industry situation. The event was sponsored by the AAPG Student Expo Committee, chaired by Fernando Ziegler, which organizes student expos and job fairs across the United States.

Participants heard about day-to-day life in the petroleum and environmental industries and learned job search strategies and interview tips. They also had the opportunity to submit their resumes for review by an industry recruiter.

The seminar also included an interactive panel discussion with five seasoned professionals representing operators, service companies and academia.

Students asked panelists about doctoral studies, traveling after graduation and how to distinguish themselves from their peers.

Panelists also had questions for students. When asked why they decided to study geoscience, students almost unanimously answered, "We love being outside."

When asked what they considered the most important lesson from their geoscience studies, students cited problem-solving, patience, teamwork, learning when to ask questions and learning how to display data in various forms.

One participant admitted that his greatest geoscience lesson learned was "knowing there's always someone smarter than you."

Panelist Gretchen Gillis, of Aramco Services Company, said humility is an important characteristic for individuals entering the industry.

In chatting with students after the seminar, Gillis said that the unpretentiousness of today's graduates is refreshing. She recalled times when students graduated with several job offers to consider and noted that having so many options right away sometimes led to overconfidence. Students graduating during downturns are more likely to have an open mind and be willing to learn, she said.

I'm Graduating – What Now? Q&A with Seasoned Professionals

Is it a good idea to travel for a year after graduation?

▸ "Traveling is a good idea, but stay engaged. Keep reading about the energy industry. Learn about other cultures. Learn about energy, water and other resources in places you visit." - Gretchen Gillis, Aramco Services Company

▸ "Keep your AAPG network active. Stay involved with your local society. Write a blog. Give a photo presentation to a local society." - Steve Brachman, Wapiti Energy

Will getting a doctorate help or hurt my chances of getting a job in the industry?

▸ "Most service companies hire Ph.D.s for research positions, but when those positions are not available, you may have the opportunity to work in other areas. In these times, having a Ph.D. may not give you an advantage, but it will not put you at a disadvantage." - John Dribus, Schlumberger

How do I know which job is right for me?

▸ "It's hard to predict exactly what job you'll like. It is easier to look back and see if you were happy or not with a type of work and company structure. That's why we encourage a wide range of experiences. See what you liked and do more of it." - Robert Stewart, University of Houston

How do I know which company is right for me?

▸ "Recruiters and company employees generally understand their corporate culture and who will be a good fit. It's important to ask them questions as well as read everything that you can about the organization. On the other hand, the key things for you to determine are: What you like, what you're good at, and where can you be productive and paid." – Robert Stewart, University of Houston

How do I get a competitive edge?

▸ "There's no guarantee that if you take this class and not that one, that you will be successful. It's those other skills that give you an edge and convince us that you should come to work with us. If you do something you enjoy, that will give you confidence. That confidence will give you that edge." - Steve Brachman, Wapiti Energy

▸ "If you're doing something you're miserable in, you will not do a good job, and your employer will know it. In my experience, a happy person is a person who performs well. Make sure you make good choices, and choose something you like and enjoy. Do your best, and offer it with pride." - John Dribus, Schlumberger

▸ "Smile, make people comfortable around you. Listen, ask questions, and you're there." - Julia Dombrowski, ExxonMobil Corporation

Editor's Note: The opinions expressed in the Commentary section do not necessarily reflect those of AAPG, its leadership, or the EXPLORER editorial staff, but are the writers' own.

COMMENTARY

Climate Change Discussions Should Evoke Policy Discussions within AAPG

By Jeffrey B. Aldrich, Randi Martinsen, James M. Rine and Jim Tucker


ALDRICH

It is encouraging to see discussions concerning climate change in the pages of the EXPLORER after being absent for over a half-decade, a period during which the vast majority of world governments have agreed to limit carbon emissions and at least nine medium- to major-petroleum companies, which do business in the United States, are currently factoring some kind of carbon emission restrictions into their long-range business plans.

Although we applaud the comments of Dr. Robert Yeats (January) and those of Dr. Lee Gerhard and Bob Shoup (April), we disagree with their suggestion to hold a "scientific debate" within AAPG over the science of climate change. We support the AAPG Executive Committee, which in disbanding the AAPG Committee on Climate Change issued a statement that the AAPG, an association dedicated to the science of petroleum geology, is not the best forum for technical discussion of atmospheric science, and feel such discussions should be left to organizations that deal with climate science on a day-to-day basis, such as the American Geophysical Union.

What we feel AAPG should be discussing within our membership and all our Divisions, is how to plan energy/mineral exploration and production strategies based on impending regulations or carbon taxes. In addition, we should be considering how AAPG Members design future infrastructure for rapidly rising sea levels and extreme weather events that are projected by models to increase in the future and thus have a greater impact on operations.

In our opinion, AAPG should also be part of a conversation refuting the public perception that immediately eliminating the petroleum industry will stop global warming.

For at least several decades to come, energy created by fossil fuels is necessary to not only power the global economy but also to be part of the renewable energy infrastructure as they are developed. AAPG needs to be part of the conversation on global energy use (hydrocarbon, coal, nuclear, geothermal and renewables) to help change the public perception that our industry is solely the problem and, instead, be considered part of the solution.

Consequently, we urge AAPG to hold forums, reestablish a committee or form special interest groups to discuss how AAPG should address the issue of global energy production in a dynamic environment and a changing climate.

In closing, there are three points that we, as petroleum professionals, should consider in the broader debate over climate change:

- Recognize that the long-term geological record shows fluctuations in climate and that, for the past 20,000 years, the Earth is coming out of a glacial period and hence there is naturally occurring glacier melting and subsequent sea level rise. During that time, some of the rates of sea level rise have far exceeded the current rate of sea level rise.
- Acknowledge that CO_2 and methane introduced into the atmosphere through burning coal and oil, by deforestation, by raising livestock, etc., have made measurable contributions to the continued rise in global temperature.
- Our industry must strive to help raise the standard of living for the billions of people still relying on charcoal and animal dung for energy while also addressing the consensus agreement of both developed and developing nations at the 21st annual Conference of Parties to limit a rise in global temperatures to 2.0 degrees Celsius (3.6 Fahrenheit).

This is where AAPG should be part of the discussion.

AAPG Foundation Honors Undergraduate Geoscience Excellence

By APRIL STUART, AAPG Programs Coordinator

No matter the industry's climate, inspiring and educating young geologists is at the heart of the AAPG Foundation's mission. Maintaining and growing a permanent non-profit foundation supporting educational and scientific activities in the field of geology is the central mission of the AAPG Foundation, and the organization achieves that mission through funding a myriad of educational programs.

The Foundation's generous contributors have consistently worked to make a big impact within geologic education at the collegiate level with two important undergraduate-focused geoscience programs: the L. Austin Weeks Undergraduate Grant Program and the new U.S. Military Veterans Scholarship Program.

These programs promote educational opportunities for students and student groups studying internationally, as well as opportunities for veterans in the United States who are attempting to return to school and secure geology degrees. These emphases encompass what the Foundation is all about – paying forward the opportunity to empower geology students to further their education both inside and outside of the classroom.

MVSP recipient, Wesley Weisberg, stands in front of trough cross bedding among glacial deposits in Thorp, Wash.

Supporting Geoscience Education Worldwide

In 2016, the L. Austin Weeks Undergraduate Grant Program drummed up more interest than ever. More than 300 students and 100 student organizations applied for grants this year. The L. Austin Weeks Undergraduate Grant Committee, led by Ron Nelson, worked hard to score the many applicants. While there were many deserving applicants, the Foundation was only able to fulfill grant requests from 38 percent of those who applied for funds.

2016 MVSP Recipients

Christopher Ammon	Army Reserve	SGT/E-5	Utah State University
Cody Garcia	Army	SPC/E-4	Salisbury University
Jacob Lasater	Army	SGT/E-5	Rocky Mountain College
Daniel Orazi	Army	Staff Sergeant	Indiana University-Purdue University
Gregorios Petropoulos	Marine Corps	Corporal	University of Nevada, Las Vegas
Jacob Pratt	Marine Corps	E-4	Appalachian State University
Ryan Rosol	Navy	Midshipman	University of Oklahoma
Christopher Shea	Marine Corps	Corporal	University of Oklahoma
Jeffrey Snowden Jr.	Army	Staff Sergeant	Midwestern State University
Wesley Weisberg	Navy	E-5	Missouri State University

Supporting U.S. Veterans

In its second year of operation, the AAPG Foundation's U.S. Military Veterans Scholarship Program (MVSP) continues to promote education and career opportunities to veterans, aiding in the transition to educational and civilian technical professions, as well as advance and promote geoscience programs within higher education institutions.

The MVSP Committee, chaired by retired Air Force Lt. Col. and AAPG Foundation Trustee Associate Don O'Nesky, gave generously of their time and talents during the review process this year. The Committee reviewed many eligible applications and in 2016 awarded 10 veterans $2,000 in scholarship funds to help support them and their families in their efforts to transition to a career in the geosciences beyond the military.

These veteran recipients are primed to shine in their fields, as their skillsets translate to hands-on, applied careers in the geosciences. With the help of these scholarships, these aspiring geoscientists are better able to complete their degrees, less burdened by the high cost of tuition, which often results in many students stalling or halting continuing education.

More support is needed. Consider making a donation to one of these programs today. Call the AAPG Foundation to pledge your support to geoscience education (918) 560-2644, or visit our website for more information at foundation.aapg.org.

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

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Donald E. Walker
Judson B. Walker
Terrence L. Walker
William B. Walker Jr.
Gary M. Walters
Edward B. Wasson
Ron F. Waszczak
William G. Watson
Kenneth J. Wells
Dave A. Wheller
Patrick Whitley
Mark S. Whitney
Bruce H. Wiley
Joel S. Williams
Robert D. Williams
Robert Williams
Ann O. Willis
Stephen E. Wilson
Wilbur D. Wilson
Jeremy C. Wire
April R. Wisebaker
James C. Woodson
Franklin G. Yoris
J. Marc Young
Gerald P. Zieche
Barry L. Zinz

Awards Fund

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Professorial Award
William T. Stelzer Sr.

Daniel A. Busch Library Fund

Conrad E. Maher

Digital Products Fund

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Stephen H. Secrest
Beloit College
Nancy L. Engelhardt-Moore
Heriot Watt University
Richard P. Steele
Michigan State University
Michael W. Barratt
Oklahoma State University
Zachary A. Poland
John D. Seale
Stanford University
Gary Robinson
Texas A&M University
Jon Burrell
Michael G. Eide
Texas Tech University
George A. Anderson III
Paul Sylvester
William R. Torguson Jr.
Ohio State University
Arthur W. Browning
University of Arkansas
John C. Goss
University of California, Berkeley
Nicholas G.K. Boyd III
University of Colorado
William W. Bayne
University of Houston
Steven D. Mills
Gary Robinson
University of Kansas
Allan S. Hemmy
University of Kentucky
Jonathan L. Konkler
University of Louisiana Lafayette
Jonas W. Bailey
University of Minnesota
Conrad E. Maher
University of Oklahoma
Kenneth Aniess
University of Texas
Steven D. Mills
University of Wyoming
Nicholas G.K. Boyd III
R. Ragnar Rasmussen
Virginia Tech University
David R. Grogan
West Virginia University
Simon L. Cole

Distinguished Lecture Fund

David L. Allin
Robert J. Ardell
In memory of Charles Weiner
Kazuyoshi Hoshi
Douglas K. Morton

Dean A. McGee Distinguished Lecture Fund

Michael G. Webb

Roy M. Huffington Distinguished Lecture Fund

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Education Fund

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Walter T. Levendosky
Leslie L. Pena
Donald A. and Mary ONesky Named Grant
John B. "Jack" Thomas
Eastern Section Named Grant
James McDonald
Edward B. Picou Jr. Named Grant
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John B. "Jack" Thomas
Leigh S. House
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Martha O. Withjack
Gustavus E. Archie Memorial International Grant
Conrad E. Maher
James E. Hooks Memorial Grant
Kathryn H. Dando
Mark A. Dando
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Jay M. McMurray Memorial Grant-in-Aid
Walter and Allene Kleweno
In memory of Jay M. McMurray
John D. "Jack" Edwards Memorial Grant
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Barry C. McBride
Kenneth O. Stanley Memorial Grant
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Marilyn Atwater Memorial Grant
Maryann L. Malinconico
Michel T. Halbouty Memorial Grant
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Mruk Family Named Grant
Denise M. Cox
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Arthur P. Baclawski
Randi S. Martinsen
David L. Read
Ohio Geological Society Named Grant
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James McDonald
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Pittsburgh Association of Petroleum Geologists Named Grant
Dan A. Billman
Raymond C. Moore Memorial Grant
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Wade D. Hutchings
Laura I. Net
Stephen C. Ruppel
Weimer Family Named Grant
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William E. and Jean Crain Named Grant
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In memory of John and Ginny Jacobson

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Imperial Barrel Award Fund

Adrian J. Burrows

Chevron Matching Employee Fund

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Mark L. Hales
Alan S. Kornacki
James D. Lowell
George R. Macaulay Jr.
In memory of W.H. Robbins III and T.M. Ellis
Conrad E. Maher
In memory of Ewald Kock, John Forman and Hugh Mason
Sarah Springer and Rusty Riese
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Hugh Looney Excellence Fund

Estate of Tillie Looney

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Gary Robinson

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Borden R. Putnam III
Wayne A. Schild

Edith Allison, director of AAPG's Geoscience and Energy Office in Washington, D.C., can be contacted at eallison@aapg.org; or by telephone at 1-202-643-6533.

Hot Topic in D.C.: Arctic Policy

By EDITH ALLISON, Geoscience and Energy Policy Office Director

Arctic energy is in the news as summer steams into Washington, D.C. Major issues include the midpoint of the two-year U.S. chair of the Arctic Council; public campaigns for and against including the Beaufort and Chukchi Seas in the 2017-22 offshore oil and gas leasing plan; and plans for the United States to build the first heavy icebreaker in 40 years.

Arctic energy deserves more attention than it usually gets. The estimated undiscovered, technically recoverable resources in the U.S. Chukchi and Beaufort Seas is 23.6 bbl and 104 tcf of natural gas, according to 2016 data from the Bureau of Ocean Energy Resources – equivalent to over half that estimated for the Central and Western Gulf of Mexico.

Large energy resources also occur in the onshore and offshore Arctic of other nations.


ALLISON

> **Arctic energy deserves more attention than it usually gets.**

Arctic Council

The White House and Congress recently scheduled hearings, briefings and reports to mark the midpoint of the 2015-17 U.S. chair of the Arctic Council.

The Council, which includes Canada, the Kingdom of Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden, the United States, and six organizations representing Arctic Indigenous peoples, is celebrating its 20th anniversary. The Council promotes cooperation, coordination and interaction among the Arctic states and Arctic inhabitants on common issues, particularly sustainable development and environmental protection.

The Council continues to advance two agreements for multinational cooperation: the 2011 agreement on Arctic search-and-rescue and the 2013 agreement on marine oil pollution preparedness and response. Currently the Council is preparing a database of response assets and updating a field guide on best practices for response. It is also incorporating recommendations of the National Academies of Science "Arctic Spill Response Assessment," published in 2014.

On the scientific front, the Council expects to have a binding agreement to enhance scientific cooperation in the Arctic ready for signing at the Fairbanks, Alaska, Ministerial Meeting in 2017. In addition, the White House will host the first Arctic Science Ministerial on Sept. 28, aiming to expand collaboration on Arctic science, research, monitoring and data sharing.

Register Now for Geosciences Congressional Visits Day, Sept. 13-14, 2016.

AAPG and other geoscience societies – including the American Geophysical Union, American Geoscience Institute and Geological Society of America – are once again arranging congressional visits this fall for our members.

The geo-societies will provide a half-day of background information and training on Sept.13, and will schedule and accompany you to meetings on Sept. 14.

This year, you can expect useful and informative meetings because Congress will be in session and interested in hearing about constituents' interests and concerns before devoting the month of October to campaigning. In addition, as the next federal fiscal year looms on Oct. 1, legislators will be working to finalize appropriation bills to fund the government. You can provide information about funding concerns or about issues that may become appropriation bill riders; for example, bans on the implementation of federal regulations or restrictions on geoscience research.

For more information or to participate in Geo-CVD contact Edie Allison at (202) 643-6533, or eallison@aapg.org by Monday, Aug.15.

OCS 2017-22 Leasing Plan

During the multi-year development of the Outer Continental Shelf (OCS) 2017-22 oil and gas leasing plan, the Department of the Interior has received hundreds of thousands of comments from groups advocating to include or remove the U.S. Arctic from the plan. (The mid- and south-Atlantic areas were removed from an earlier version of the plan.) The latest iteration of the plan was open for comment until mid-June. The Department of the Interior will review all the comments

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before releasing an updated plan for public comment.

Comments range from one-sentence statements in support or opposition to offshore drilling to detailed analyses of the potential impacts of the plan.

Generally, environmental groups stress the environmental sensitivity of the Arctic or the need to stop producing all fossil energy. Alaskans, including indigenous groups, generally support Arctic drilling, citing the economic benefits of developing OCS resources.

Notably, a group of former military leaders announced their support for Beaufort Sea and Chukchi Sea leasing, arguing that the United States needs to maintain its involvement in the Arctic to protect U.S. interests and promote cooperation. This is a growing concern, as China, Russia and other countries increase their Arctic activities, especially shipping, and energy and mineral resource development.

Several bills have been introduced in the House and Senate either in support of or opposed to Alaska Arctic lease sales. None of these are likely to become law.

Plans for a New Icebreaker

As the summer extent of Arctic ice has shrunk, commercial shipping and even tourist cruises have increased. This increases the need for icebreakers to be available for emergencies. In addition, security experts argue for the United States showing the flag in the Arctic, where multiple nations are staking claims for territory beyond their traditional 200-mile exclusive economic zones.

The United States is conspicuously lagging in icebreaking capacity. The one operational heavy-duty icebreaker, Polar Star, was commissioned in 1976. The United States also has a medium-duty icebreaker, the Healy, which was commissioned in 1999. The need for one or more new heavy-duty icebreakers has been discussed for many years, but this year both the White House and Congress show enthusiasm for expanding the icebreaker fleet. The president's budget request for next year would fund a planning effort. Recently introduced House and Senate bills would instruct the Coast Guard or Navy to procure several heavy-duty polar icebreakers. More significantly, $1 billion is included in next year's Defense Department appropriations for the Navy to start work on a heavy-duty icebreaker for the Coast Guard.

"ProTracks" is an ongoing feature of the EXPLORER, offering news and information pertinent to getting started or getting better in your career. Keep up-to-date with the YPs on Facebook, Instagram, Twitter and LinkedIn.

PROTRACKS

YP field trip group at Stanley Glacier. Photo by David Rajmon.

YPs Stampede into Calgary:

Highlights from YP Events at ACE 2016

By MEREDITH FABER, Young Professionals Committee Co-Chair and Geologist at Noble Energy

FABER

The AAPG Annual Convention and Exhibition in Calgary, Canada was a meeting of many firsts. It was my first time in a city mostly known to me as the hometown of the Dallas Stars' ice hockey rival, the Calgary Flames, a former host to the Winter Olympic Games and the site of one of the rowdiest weeks of rodeo-based entertainment in the world, the Calgary Stampede. For the AAPG Young Professionals (YPs), it was not only the first time we held a YPs-only field trip, but also the first time we attempted an ambitious four-event program.

Reaching New Heights

On Saturday, a bus full of YPs disembarked from downtown Calgary bound for Kootenay National Park for the Young Professionals Guided Hike to Stanley Glacier and Marble Canyon led by Drs. Jean-Bernard Caron and Robert Gaines.

The trip featured outcrops of the Cambrian-aged Burgess Shale, renowned for its exquisite preservation of soft-bodied marine organisms. After a brief stop at Marble Canyon, the group began what would be a roughly four-hour climb to the Stanley Glacier field site. Though the traverse was challenged by a mix of rain, hail, sleet and heavy snow, and posed an additional challenge for those of us more accustomed to life at sea-level, we eventually arrived at the Burgess Shale outcrop and became the first group not affiliated with the Royal Ontario Museum expeditions to visit the excavation site.

Once back on the bus after a safe descent, participants expressed their appreciation of the field trip leaders, Canada Region YP Coordinator Meriem Grifi and her committee and field trip sponsor Noble Energy.

Making Connections

The next afternoon, YPs, students and experienced professionals convened at the BMO Centre for the Young Professionals Meet and Greet also sponsored by Noble Energy. The attendees were organized into small groups consisting of experienced professional "mentors" and student/YP "mentees" for informal discussions on such diverse topics as interviewing techniques, convention expectations, soft skills and the industry downturn. The event was so popular that we had to request additional chairs from the conference center staff. After extending my appreciation to the group for the amazing turnout, I introduced AAPG Secretary Heather LaReau, who welcomed the participants on behalf of Noble Energy. She encouraged both mentors and mentees to ask questions and learn from one another and invited everyone to continue the dialogue later that evening at the YP Networking Reception. We were later joined by AAPG President John Hogg, who shared his thoughts on the importance of networking and mentoring.

Following the Opening Session and Icebreaker, YPs, students, mentors and even a few Imperial Barrel Award teams celebrated the start of the meeting at the YP Networking Reception at The Unicorn Sports Cantina. Food and drinks provided by the event sponsor helped create an inviting atmosphere for discussion. The Unicorn became a regular YP hangout during the meeting, offering a space to decompress from the fast-paced environment of the convention center.

Creating Career (and Comedic) Potential

On Tuesday, the YPs returned to the BMO Centre Mustang Room for a YP Focus Session facilitated by Dr. Susan Nash, AAPG's director of Innovation and Emerging Science and Technology. In a presentation entitled "How to Build Your Own Business Opportunities," Nash discussed strategies for developing your personal brand, diversifying your marketable skill set and

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IN MEMORY

Deborah Beier, 58
White City, Ore., Jan. 11, 2016
Charles Booth, 92
Ashland, Ore., Feb. 27, 2016
Henry H. Bretthauer, 70
Eugene, Ore., April 8, 2016
John Clanton, 83
Corpus Christi, Texas, June 11, 2016
Frederick E. Digert, 82
Boulder, Colo., May 13, 2015
Ben Donegan, 88
Amarillo, Texas, Jan. 27, 2016
Wallace Dow, 79
Tulsa, Okla., June 28, 2016
William H. Elson Jr., 92
Tulsa, Okla., May 10, 2016
Noah Fishman, 65
Midland, Texas, Nov. 4, 2015
William E. Harlan III, 80
Houston, Texas, Feb. 3, 2016
Eugene B. Harris, 75
Angleton, Texas, April 29, 2016
Jack Hitt, 90
Austin, Texas, Jan. 12, 2016
Alvin Hope, 90
Abilene, Texas, April 29, 2016
Kenneth Johnson, 85
Cambridge, N.Y., Sept. 25, 2015
Jay Marks, 99
Englewood, Colo., March 28, 2016
Ray G. Martin, 74
Katy, Texas, March 19, 2016
George D. Mathews, 88
Ruidoso, N.M., April 27, 2016
Charles F. McKillop, 81
Montrose, Colo., April 25, 2016
John Melby, 71
Arvada, Colo., Aug. 8, 2015
Steven Millan, 79
St. John's, Canada, May 27, 2016
Leland Moore
Washington, D.C., Sept. 23, 2015
Daniel Nisley
Pearland, Texas, April 23, 2016
Solomon Olabode, 43
Akure, Nigeria, June 25, 2016
Stephen Paine, 61
Norman, Okla., Nov. 19, 2015
Tom Redin, 91
Ventura, Calif., May 6, 2016
Richard E. Rhoades, 85
Casper, Wyo., March 29, 2016
Hollis A. Scoggin, 89
Richardson, Texas, May 1, 2016
Richard Sellers, 81
Sapulpa, Okla., Dec. 24, 2015
Darrell E. Smith, 89
Midland, Texas, Jan. 21, 2016
Stephen P. Stagoski, 59
Sugar Land, Texas, Nov. 22, 2015
Wilford Stapp, 97
San Antonio, Texas, Nov. 28, 2015
Harold Sugden, 86
Bakersfield, Calif., Jan. 11, 2016
Jen F. Touborg, 75
Oakville, Ont., Jan. 28, 2016
Jack Williams, 91
Jefferson, Texas, Jan. 1, 2016

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

AAPG YPs network at The Unicorn. Photo by Meredith Faber.

Continued from previous page

utilizing free or low-cost data and software resources to remain competitive in the job market. Attendees shared personal experiences where adaptability and thinking outside traditional job descriptions helped them succeed. I offered my own experience as a long-form improv comedy performer as an example of how an unusual skill that teaches you to think on your feet can create workplace opportunities. Those in attendance then bore witness to the comedic stylings of Nash and I as we demonstrated how comedy can be used in a professional setting.

Building Momentum

The industry downturn has had a profound impact on oilfield workers worldwide, but the success of YP events at ACE Calgary shows that the future is bright.

Now is the time to strengthen your relationships with professional societies like AAPG, local societies and other geoscientists. The AAPG Young Professionals Special Interest Group (SIG) is committed to offering unique services and experiences like those at ACE Calgary to AAPG YPs and we encourage all AAPG Members to rally to this cause.

Thank you to everyone who supported and participated in the Calgary events. We've got big plans for the 100th anniversary of AAPG at the 2017 ACE in Houston and we look forward to celebrating this historic event with the entire membership.

If you're interested in volunteering with the AAPG YP SIG, or just want to learn more about YP initiatives in your area, visit us online at aapg.org/youngpros and contact your Region or Section YP Coordinator. You can also 'like' the AAPG Young Professionals Special Interest Group Facebook page and follow us on Twitter and Instagram @aapgypsig. See you next year in Houston!

DIRECTOR'S CORNER

Another Opportunity For Reinvention

By DAVID CURTISS

Unconventional resources have transformed the global energy landscape. And as this issue hits your mailbox, geoscientists and engineers from around the world are in San Antonio, Texas for the fourth edition of URTeC, the Unconventional Resources Technology Conference from August 1-3.

Conceived and developed by AAPG, the Society of Exploration Geophysicists (SEG), and the Society of Petroleum Engineers (SPE), URTeC is "the integrated event for unconventional resource teams." Its design reflects that unconventional resources require an integrated approach across disciplines for successful development, and that it is the multidisciplinary team that will drive success.

And this year the team has been expanded beyond geology, geophysics and petroleum engineering with the addition of eight supporting organizations:

- American Institute of Chemical Engineers (AIChE).
- Association for Iron and Steel Technology (AIST).
- American Society of Civil Engineers (ASCE).
- American Society of Mechanical Engineers (ASME).
- Society for Mining, Metallurgy and Exploration (SME).


CURTISS

It's the ingenuity and innovation that brought (unconventional) resources to market that will position the industry for the eventual recovery.

- Society of Petroleum Evaluation Engineers (SPEE).
- Society of Petrophysicists and Well Log Analysts (SPWLA).
- The Minerals, Metals and Materials Society (TMS).

Fully recognizing the pressures the current downturn in oil and natural gas commodity prices are putting on unconventional resource development, the technical program committee led by Tom Blasingame of Texas A&M University (SPE), Skip Rhodes of Pioneer Natural Resources (AAPG) and Gene Sparkman of Lumina Technologies (SEG) has created a stellar program. It includes more than 300 technical presentations and ePosters including the geology of mudrocks, unconventional petroleum systems, attribute analysis, well log analysis, rock mechanics, reservoir modeling, production strategies and case-studies.

In fact, some of the presentations, such as the Operator's Forum series, include team presentations in which the talks are presented by individuals representing different disciplines further reinforcing the integrated nature of the conference.

The conference launches with two plenary sessions: The opening plenary is entitled "The U.S. Returns to Pre-OPEC Dominance" and features Scott Sheffield, chairman and CEO of Pioneer Natural Resources; Dan Dinges, chairman, president and CEO of Cabot Oil and Gas Corp.; and Gary Ross, executive chairman and head of global oil for PIRA Energy Group, Inc.

The second plenary will feature Roger Aines of Lawrence Livermore National Laboratory, Michelle Foss of the Texas Bureau of Economic Geology's Center for Energy Economics, and Mike Lynch of Strategic Energy and Economic Research, discussing "Technology, Regulation, and the Future of Oil and Gas and Alternatives."

In addition to the technical program and plenary sessions, the committee has organized seven short courses, two field trips, breakfasts and luncheons featuring topical guest speakers, and an exhibition where you can learn about new and emerging technologies, inspect core from resource plays and network with other science and engineering professionals.

Unconventional resources have transformed the global energy landscape. And as I've written repeatedly in this space, it's the ingenuity and innovation that brought these resources to market that will position the industry for the eventual recovery.

Or as Blasingame, Rhodes and Sparkman put it, "… the upstream industry has been given another opportunity to reinvent itself."

That's what URTeC 2016 is all about: Finding better and cheaper ways to bring unconventional resources to market. The oil and natural gas is there and the demand will be eventually. It's time to get ready.

DIVISIONS REPORT: EMD

Getting to Know the Energy Minerals Division

By ANNE DRAUCKER, EMD President

First of all, let me thank all the past officers of the Energy Minerals Division, especially our Past President Bob Trevail. AAPG is actively building a strong mentoring community and I am the beneficiary of advice and guidance from many more experienced leaders.

As a YP still learning about this organization and about my own abilities, and in a low-price environment where training and development opportunities are sometimes constrained, I value my involvement with AAPG and EMD more every day. I'm looking forward to working with the new officers and to the fresh ideas they're sure to bring. I also love that EMD has a stable core group of involved chairs and councilors who provide perspective and direction, steadying the helm, so to speak.

What It's All About

In the last few years, I've encountered a surprising number of AAPG Members (new and experienced) who were not familiar with the technical divisions of AAPG and what they do. Given how much excellent work is done in the divisions, I'd encourage everyone to check out the divisions' websites or chat with an involved Member. In the meantime, here's a little of what EMD is all about.

The stated purpose of the Energy Minerals Division is to serve AAPG Members by "advancing the science of economic geology as it relates to any earth materials, other than conventional oil and gas, capable of being used for energy production, to provide a forum for addressing developments in mineral and energy economics and in fuels supply and utilization technology, and to promote the integration of geoscientific knowledge with related professions and activities."


DRAUCKER

Until I became involved in the leadership, I was unaware of the sheer volume of high quality, diverse work being generated by the membership.

Each specific resource has a Technical Commodity Committee that issues annual reports and organizes papers, books, talks, posters and more.

The Technical Commodity Committees are:

- Unconventional Resources.
- Coalbed Methane.
- Gas Hydrates.
- Bitumen/Heavy Oil.
- Oil Shale.
- Shale Gas and Liquids.
- Tight Gas Sand.
- Coal.
- Uranium (Nuclear Minerals).
- Geothermal Energy.
- Renewable Energy (wind, solar, hydro, etc.).

I personally work in heavy oil, and while I don't often encounter the other subjects in my day-to-day work, I'm very interested in them. Seeking good, science-based content in some of these topics can be challenging, depending on the political climate at any given time. The committee reports and descriptions have become my go-to source to learn the science behind the headlines. The EMD talks at ACE and my local Section meeting are also among my favorites to attend.

Until I became involved in the leadership, I was unaware of the sheer volume of high quality, diverse work being generated by the membership. That kind of knowledge sharing and the opportunity to learn are among the best features of our professional society. If you have any interest in the aforementioned committees, feel free to contact me, the committee chairs or your local councilor. I've yet to meet a geologist who didn't love to discuss their chosen specialty, and the EMD officers I've met are no exception. Not only are they a great technical resource, but they would probably allow you to buy them a beer and call it networking. The reports and committee members can be found under the committees link on the EMD website.

The Cool Factor

We also partner with the other divisions to provide even more science.

For those unfamiliar, the others are the Division of Environmental Geosciences (DEG), the Division of Professional Affairs (DPA) and Petroleum Structure and Geomechanics Division (PSGD). And, there's also the AAPG Astrogeology Committee.

Did you read that? *Astrogeology*. I am constitutionally incapable of resisting a Mars talk. Honestly, I would have joined EMD for that alone.

If you've been thinking you might like to become more involved with AAPG, more involved with your local Section or Region, or have an interest in any of the subjects EMD covers, then we have several great opportunities to volunteer. We're looking for councilors for several of the Sections and Regions, and I would love to start getting more interested YPs involved with the Commodity Committees. It's a great way to get your feet wet in a group with strong mentors and a very high wealth of knowledge.

Did you know that joining EMD is free? You can check the box to join anytime by logging in to your AAPG membership account. I can't think of a downside to joining, and I will personally vouch for the benefits.

Who should join?

- Experienced professionals still curious about the world around them (I've met you, and that's all of you).
- Young professionals looking for networking, increased technical acumen, leadership opportunities, etc.
- Students looking for all of the above. Plus, EMD publications make way better references for your classes and papers than most Internet resources.
- Anyone who reacts like I do to astrogeology or any of the other aforementioned topics. Never skip a uranium or coal talk? Then EMD has more talks for you, some books to read, a field trip and some folks to meet.

If you're curious, please check out our newly re-designed website here, www.aapg.org/divisions/emd.