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Houston Geological Society
Volume 56 Number 3
November 2013

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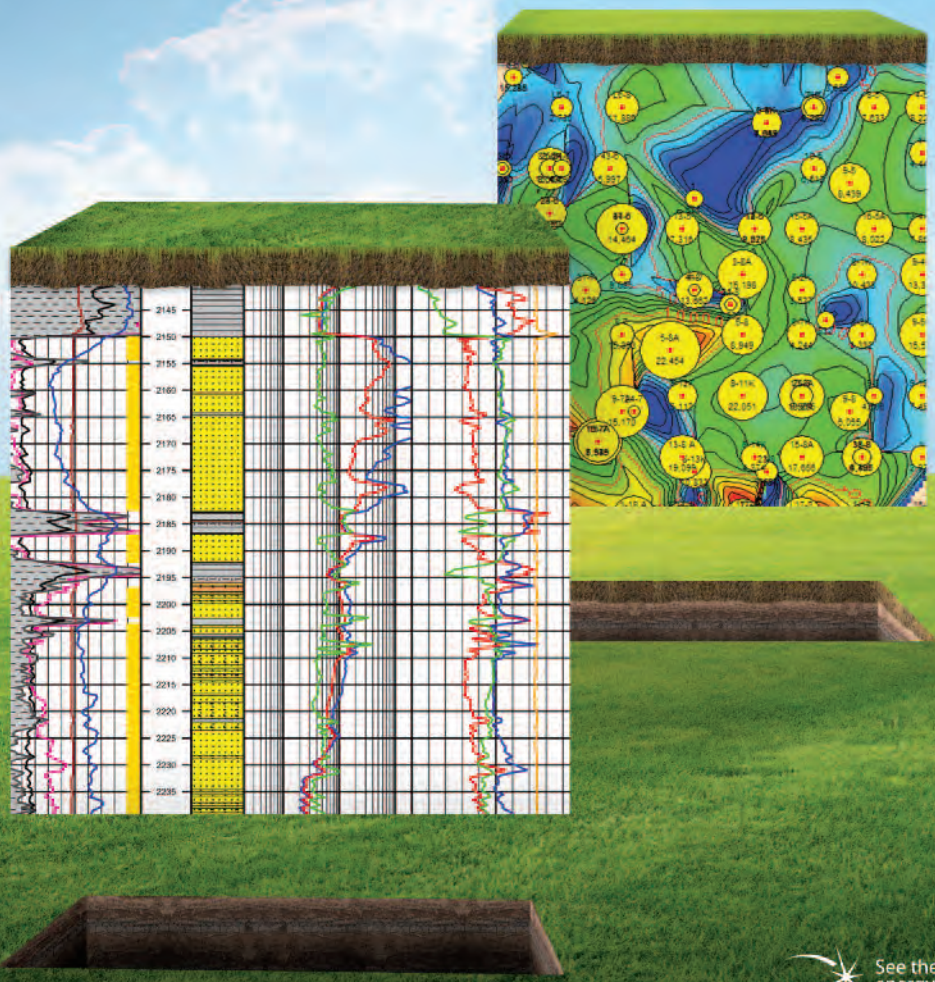

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The Bulletin
Houston Geological Society

Volume 56, Number 3 November 2013

In Every Issue

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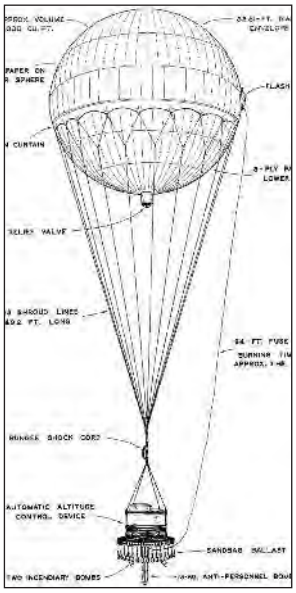

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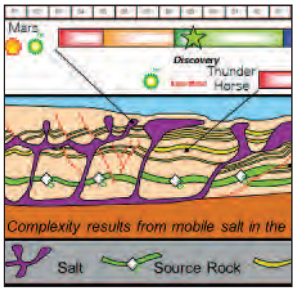

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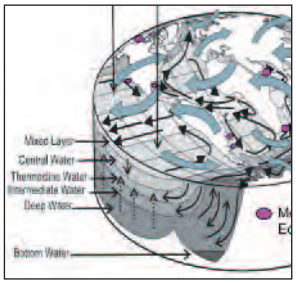

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About the Cover: A view of Point Arena in Mendocino County, California. The steeply dipping beds of Lower Miocene marine strata are exposed in cliffs that line the coast from Point Arena southward. The rocks consist of light tan colored mudstones and shales. A notable feature that appears exclusive to the Miocene strata is their very high microscopic porosity, resulting in a rock of surprisingly low density. The San Andreas Fault runs out to sea at Point Arena. At an elevation of 118 feet, the Point Arena lighthouse is the tallest on the West coast of the United States. Photograph by Michael F. Forlenza, P.G.

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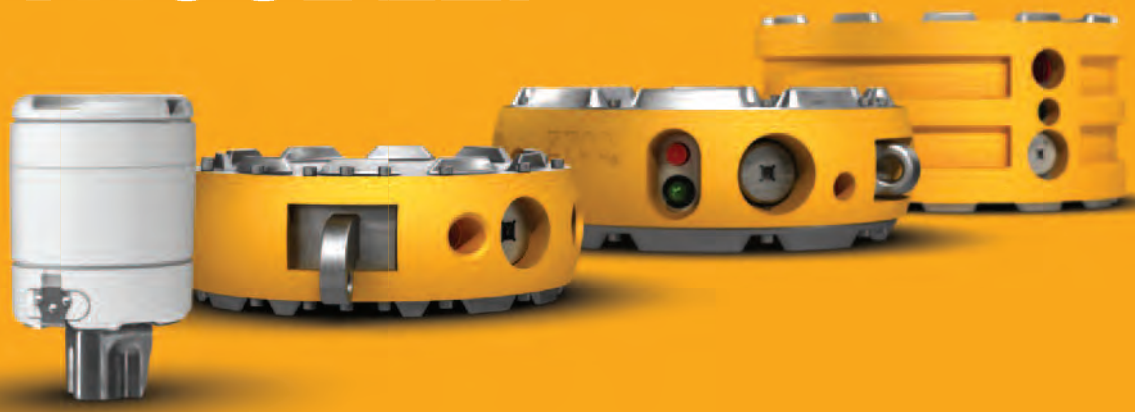

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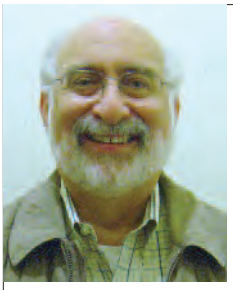

Barry Katz

bjkatz.hgs@gmail.com

A Little of Your Time, Please

Professional societies, such as the HGS, rely on volunteers to manage and carry out much of the organization's programs. These individuals truly represent the life blood of the society. Without the different committee members' active participation, the various monthly technical meetings, training opportunities, and social/networking events would not occur. Of the more than 4000 members of HGS only a relatively few, probably about 100, are actively engaged. Thus, the majority of our membership has become dependent on a relatively small number of active members. Currently this model appears to be working, but one needs to look "under the hood" to see how long this can continue without new people joining the volunteer pool. When examining the "engine" we see a number of issues that may become problems down the road.

1. The HGS is suffering from the same demographic issues as the oil and gas industry, and the key "boomer" generation is beginning to retire in large numbers. There is a significant gap in the number of mid-career individuals, representing the general lack of hiring during the downturn of the 90s. Historically, geologists become most active in professional societies during their mid-career. The newer employees are spending much of their time learning the needed skills and, in some cases, growing their families.

2. Employer demands on time have increased, driven by the continuous demand for increased productivity in the "office." Individuals are now tethered back to the office with their smartphone and laptop. For many it appears that there is an expectation of being on call 24/7. With such office demands, free time has become quite valuable and is often spent with friends and families rather than being involved with professional organizations. The drive toward increased productivity in the office has also in many cases resulted in companies no longer encouraging their employees to become involved, and occasionally even discouraging such activities.

3. The demand for HGS volunteers is increasing. In addition to the routine work of the Society, HGS will be hosting several major meetings over the next few years and providing volunteers for two AAPG meetings, including the 100th anniversary of ACE, and a GCAGS conference. Each of these events requires a significant demand on the limited volunteer pool which can result in the onset of volunteer burnout.

So yes, things are continuing to run, but the question remains: how long can we expect things to continue before the signs of wear and tear begin to show, unless there are some changes? I don't have a simple answer as to when this will occur, just as I can't tell you when peak oil will occur. However, similar to the extension of peak oil that has resulted from changes in technology, there are actions that can maintain the viability of HGS long into the future. The first action is to increase the volunteer pool. Members who have not been active now need to come forward and join a committee or stand for an office. The addition of 1 to 2% of our membership to the volunteer pool would relieve much of the stress and delay the anticipated burnout. Many of the HGS events have been handled by the same small groups for multiple years and the volunteers concerned deserve relief.

The first action is to increase the volunteer pool. Members who have not been active, now need to come forward and join a committee or stand for an office.

There are other actions that would involve structural changes as to how HGS functions and what it delivers. Some of these changes are currently being made by the HGS Board. We are reviewing the current committee structure and determining which committees and functions can be eliminated or merged. These changes would have only a minimal impact on the vast majority of the membership. Examples of two of these changes were the elimination of a printed membership directory and the elimination of the annual holiday party in its present form. The Board determined that in a digital world a static directory was no longer viable. It was understood that some members would still want a hard copy, so provisions are being made to publish the HGS directory on demand. This would shift the responsibility from a volunteer to the permanent office staff and provide a more up to date membership listing. The decision to cancel the holiday party was made after reviewing attendance and the cost to the society over the past several years. **From The President** *continued on page 9*

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Forensic Geology: Paper Balloons and Sand

The bit chatters and the cuttings come over the shaker covered in sticky brown drilling mud. After washing off the mud, the bits of Pliestocene alluvium from 900 feet below North Hollywood in California's San Fernando Valley glisten in a multitude of colors and shapes. The angular rock fragments were sourced from the exposed hard rock formations in the surrounding San Bernardino, Santa Susana, Verdugo, and San Gabriel Mountains. These source rocks include the grantoid Palm Canyon Complex, the Mendenhall Gneiss, and the Lowe Granodiorite. This unique assemblage of rock fragments is characteristic of this location and only this location. Expert analysis of this handful of alluvium would be able identify the the exact location of its origin.

The ability to tie a sand, soil, sediment, or alluvial sample to a specific location is one of the most powerful tools of the science of forensic geology. Forensic geology is the study of the Earth and earth materials to solve crimes and aid in legal cases. The earliest and still the primary textbook on forensic geology was written by Rutgers University professors Ray Murray and John Tedrow in 1975. However, Professor Murray, and several others, credit Sir Arthur Conan Doyle as the originator of forensic geology. Doyle was the creator of the fictional detective Sherlock Holmes in a series of crime stories that ran from 1886 to 1903. The character Sherlock Holmes claimed to be able to identify where an individual had been by various methods, including observing soil or clay on a person's clothing or shoe and matching the material to a specific location based on his detailed study of the exposed geology of London.

Forensic geology has been used by the Federal Bureau of Investigation and other law enforcement agencies for many years to develop evidence and to match sediment samples to unique locations. Perhaps the most remarkable story of tying a sediment sample to a specific place occurred during World War II.

During World War II, the Japanese looked for a way to strike at the United States mainland. The Doolittle Raid in April 1942, launched in response to the the attack on Pearl Harbor in December 1941, embarassed the military, and left the Japanese feeling vunerable. The American B-25 bombers struck Kobe, Nagoya, Yokosuka, Yokohama, and Tokyo. But after the loss of four critical aircraft carriers at the Battle of Midway in June 1942, the Japanese no longer had any realistic chance of attacking the 48 contiguous states. This desire for relatiliation set in motion a Japanese balloon bomb project.

Drill cuttings from a depth of 900 feet in the Pleistocene alluvium of the San Fernando Valley, California.

The balloon bombs were designed to carry high explosives and incendenary devices to the United States homeland. The incendary devices were intented to ignite woodland conflagrations. There was a widespread belief in Japan that the United States was a heavily-forested country where wildfires could cause major disruptions of the war effort and general panic. These were an early weapon of terror.

The unmanned balloons were constructed of a laminated paper envelope 30 feet in diameter that held approximately 19,000 cubic feet of hydrogen when fully inflated with a lifting power at sea level of one thousand pounds. The plan called for releasing armed balloons which would rise into the strong winds that flow during the winter months from west to east across the Pacific. A Japanese meteorologist had discovered these powerful winds at altitudes above 30,000 feet. This current of air later became known as the jet stream. The planners calculated that the armed balloons could cross the five thousand miles of ocean in three days. The Japanese had created the first intercontinental missile with twenty times the range of the German V-1 rocket.

From The Editor *continued on page 9*

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Now Explore

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From the President continued from page 5

A very small portion of the membership, about 1.5% (60 people total including members and guests) generally attend. Alternate options are being considered.

Another proposed change will require amendment(s) to our bylaws. The HGS Board will be proposing to the membership changes in the manner which candidates are nominated for board positions. Instead of requiring the ballot to have two or more candidates for all positions, except for the editor-elect, positions on the ballot could be represented by a single candidate selected by the nominating committee. The proposal does not mandate a single candidate or a slate. We chose this path although a number of professional and other non-profit organizations present a slate to their membership for endorsement. The proposal provides both flexibility and a means to carry-out an election when more than one candidate cannot be secured without a significant amount of arm twisting. Historically, those that were not originally interested in serving tend to be members of the Board in name only and do not effectively serve the membership. This proposed approach toward increasing flexibility in the HGS election process is not without controversy. Some oppose such an amendment, citing a loss of democracy and a fear that this could lead to appointed boards. As a result of these concerns, we will provide time for discussion before the proposal is formally put before the membership. This discussion will take place on the HGS website, where open comments can be posted. We believe that this proposal will provide for a strong leadership team to be in-place for years to come. This will permit the organization to thrive and will also ensure that those that are interested in serving will have an opportunity to do so. More on this will be forthcoming. Please review this material and when the time comes — vote!

One last quick note: if you haven't yet registered for the Applied Geoscience Conference "Interdisciplinary Micro to Macroscale Geomechanics" taking place November 4-5, please consider doing so. The program looks outstanding.

Until next month…

From the Editor continued from page 7

The technlogical problems for the developers were acute. In sunlight, the balloons would rise as the hydrogen heated and in darkness the balloons would descend. The repeated rising and falling would jeopardize the integrity of the laminated paper envelope and reduce the likelihood of a successful delivery. To address these issues, the planners added a release valve, altimeter, and ballast weights. The ballast would be automatically jetisoned as needed to maintain the optimum flight altitude. The ballast consisted of sand in a series of paper sacks mounted on the perimeter of the gondola. The sand for the ballast was collected from a beach nearby the site of the balloon launches.

Japanese propaganda broadcasts reported that great fires were sweeping though the forests of the western states and that the American population was in panic. Thousands of casualities were reported in the Japanese press.

Between late 1944 and early 1945, the Japanese launched more that 9,300 balloon bombs at the United States. At least 300 of these weapons reached our shores. The bombs landed in Alaska, Washington, Oregon, California, Arizona, Idaho, Montana, Utah, Wyoming, Colorado, Kansas, Nebraska, the Dakotas, Michigan, Iowa, and Texas. Canada and Mexico also recorded arrivals of the balloon bombs.

Two balloon bombs landed in rural Texas. According the the Texas Almanac, one touched down in Desdemona in Eastland County and one in Woodson in Throckmorton County. Local reports indicate that, on March 23, 1945, local school children saw the Desdemona balloon drifting to the earth where they examined the device and collected pieces of it for souvenirs. Government officials arrived in Desdemona the next day to recover the wreckage and request the return of the "souvenirs."

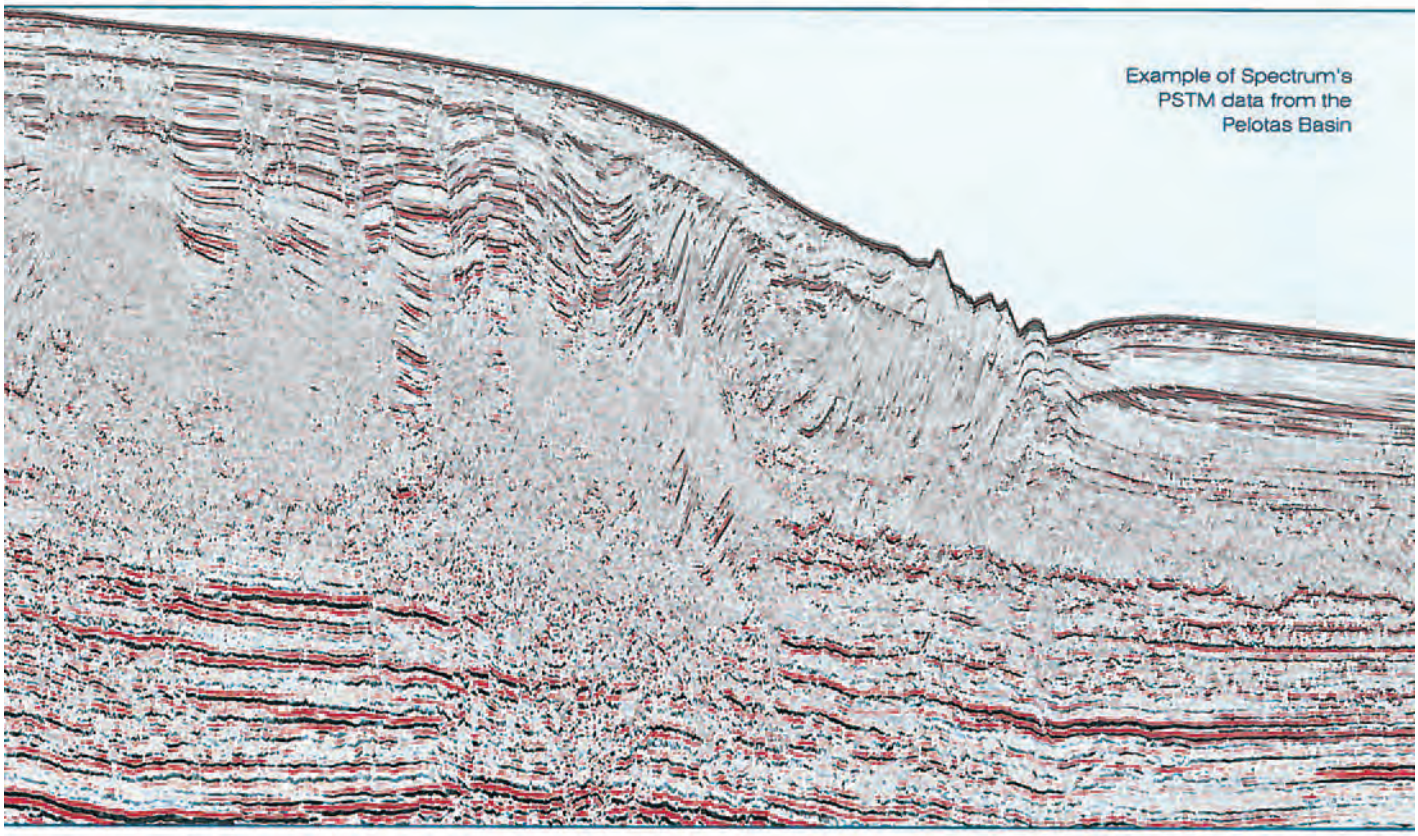
Sixty miles to the northwest the following morning, Ivan Miller, a cowboy on the Barney Davis ranch eight miles north of Woodson, was checking cattle when he came upon a collapsed balloon. The balloon had a large rising sun painted on its top. The postmaster was notified soon after the discovery, and in the early afternoon, government officials arrived to take charge of the situation. As in Desdemona, school children showed great interest in discovery and took souvenirs. And again, government officials requested that the pieces be returned.

At the time, it was inconceivable to American strategists that the balloons had travelled thousands miles across the ocean from Japan. Military leaders thought the balloons might be coming from West Coast beaches launched by landing parties. Other theories

From The Editor *continued on page 11*

Pelotas Basin Brazil

New 2D Multi-Client Seismic Available Q3 2013



Example of Spectrum's PSTM data from the Pelotas Basin

Pelotas Basin in the southern most part of Brazil has not previously seen the same level of exploration as other basins in the region. However, Spectrum's new long-offset seismic shows promising indications of an active petroleum system in the Pelotas Basin.

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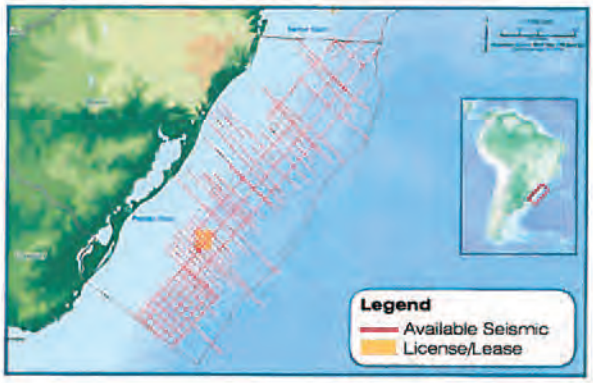

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From the Editor continued from page 9

suggested the balloons were launched from submarines, nearby Pacific islands, German prisoner-of-war camps, or the Japanese-American internment centers.

The United States government considered the balloon bombs a serious threat. They believed news of the waves of Japanese bombs drifting over the United States would spread a great concern through the American public. A strict news blackout was enforced to prevent the spread of reports of the airborne bombs and to keep the Japanese from knowing the effectiveness of the attacks. Many officials feared that the next step would be a balloon-borne bacteriological attack as Japan had previously lauched in Manchuria.

Japanese propaganda broadcasts reported that great fires were sweeping though the forests of the western states and that the American population was in panic. Thousands of casualities were reported in the Japanese press.

By early 1945, the American general public was becoming aware of the unusual threat. Despite the threat, the only American casualities of the balloon bombs were five Sunday school children and a minister's wife. The minister and his wife had taken the children on a fishing trip in May 1945 to Bly in southern Oregon, east of the Cascade Mountains. They discovered a downed device which detonated and killed the six instantly. These were the only Americans killed in the continental United States by enemy action in World War II.

Some of the bags of the sand ballast had been recovered from balloon crash sites. The sand samples were provided to the Military Geology Unit of the United States Geological Survey to see if they could determine the location where the sand was collected and thereby the launching site. The Military Geology Unit was established in June 1942, six months after the Pearl Harbor attack. The Unit studied battlefield locations to assist the armed forces with identifying building materials, drinking water sources, and suitable sites for the construction of airfields and other facilities. The Unit also studied beaches to develop

From The Editor *continued on page 13*

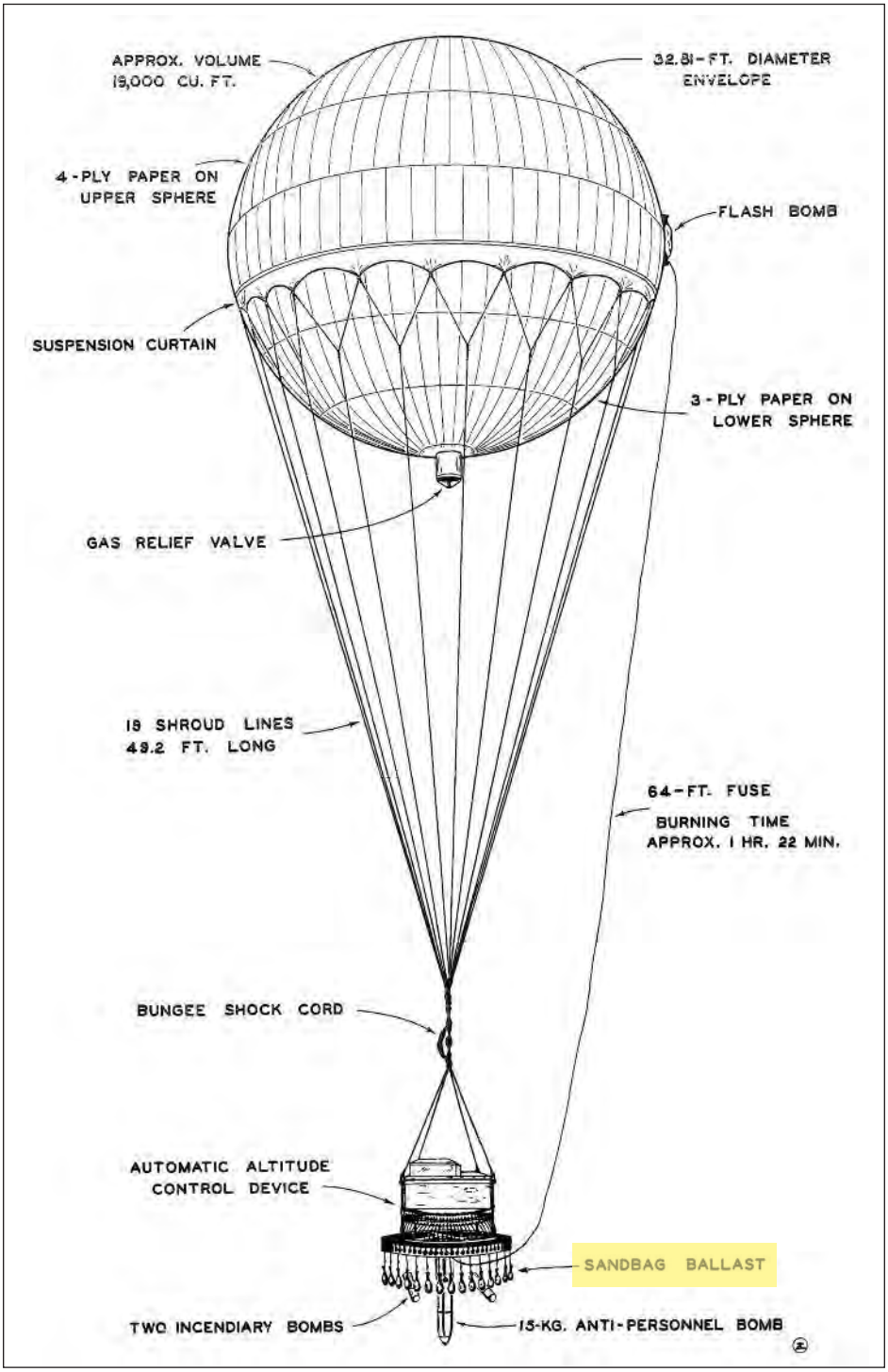

Diagram of the Japanese World War II paper balloon bomb.

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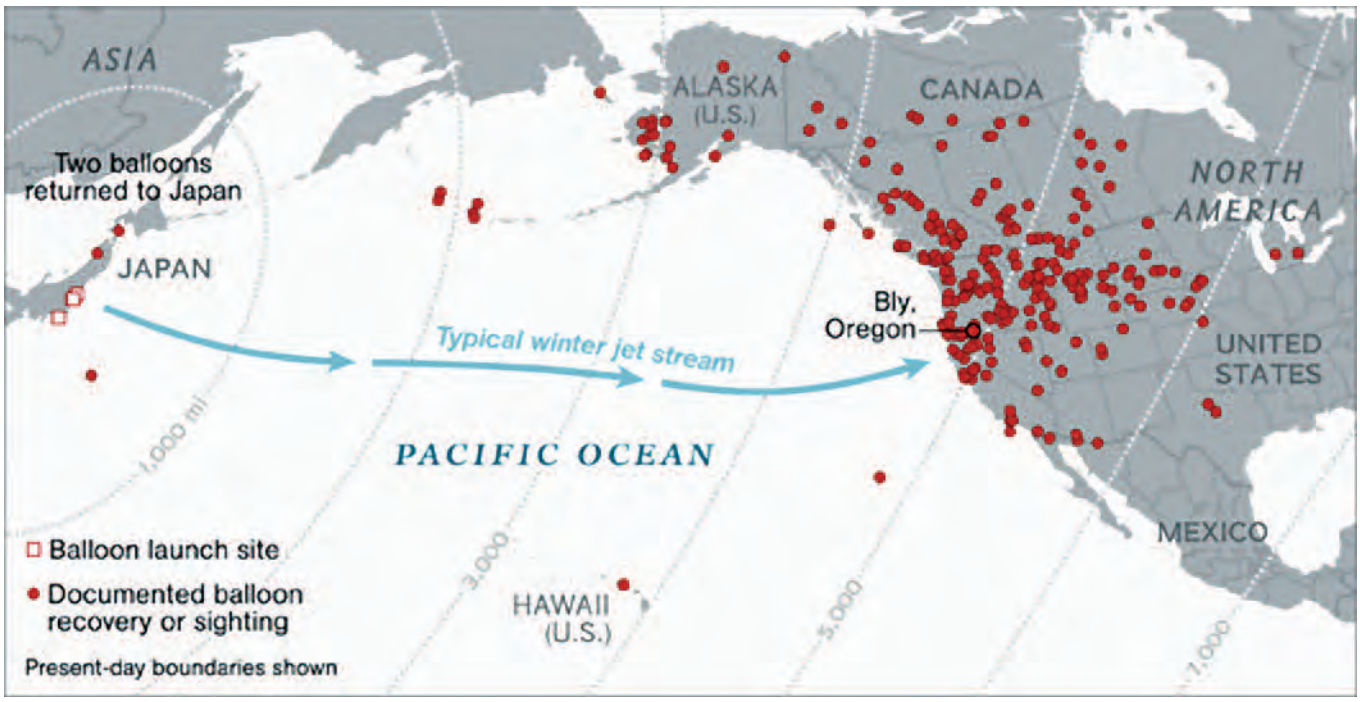
From the Editor continued from page 11



Map of Japanese balloon bomb landing locations (Source: National Geographic).

recommended landing areas. The Unit had a wartime roster of 88 geologists, 11 soil scientists, 6 bibliographers, 5 engineers, 3 editors, 1 forester, and 43 administrative staff members. The Military Geology Unit was dissolved in 1975.

To the geologists, it was immediately clear that the balloon ballast sand was not from North America or even from mid-Pacific islands. Using the tools available at the time, including polarizing microscopes and X-ray diffraction, the geoscientists delved into the genesis of the samples.

Even with the small sample size, micropaleontogists were able to identify more than one hundred species of diatoms. Diatoms, a major group of algae, are abundant and widespread throughout the world's oceans. There are three hundred genera of diatoms and twenty-five thousand species, and in one liter of sea water, there are one hundred thousand to one million diatoms. The ballast sand was obviously beach sand from a beach where there was a mixture of recent and fossil diatoms. Studying papers published by Japanese geologists before the war, the researchers were able to eliminate large parts of the county. Published papers described similar diatoms around Sendai, on the Honshu coast, northeast of Tokyo.

Interestingly there was no trace of coral in the samples. Coral does not grow in cold water. In Japan, the northern extent of coral growth is near the latitude of Tokyo. The absence of coral fragments eliminated the beaches in the southern half of the country.

Minerologists found an unusual suite of minerals that included no granitic material. This eliminated all beaches north of the thirty-fifth parallel where streams carry eroded granitic material from the inland areas. The mineralogists identified hypersthene, augite, hornblende, garnet, high-titanium magnetite, and high-temperature quartz. The high percentage of hypersthene and the unusual assemblage of minerals narrowed the potential locations of the balloon preparation area to just a few beaches.

A foramiferia specialist on loan from Texaco looked at the sand samples for single-celled microscopic creatures with calcareous shells. The forams identified in the samples occurred on the east coast of Japan north of Tokyo and nowhere else on the planet.

Finally, the Military Geology Unit narrowed the search for the balloon bombs origin to two locations roughly two hundred miles apart. Because of the absence of coral, geologists favored the more northerly location along the great beach of Shiogama, close to Sendai. Based on the geologist's findings, aerial photo-reconnaissance was conducted identifying the balloon manufacturing facilties. American B-29 bombers destroyed two of the three hydrogen plants effectively ending the balloon bomb program.

The war was largely over by the time the geologists' work led the Army Air Corps to the balloon bomb hydrogen plants in 1945. So, while their efforts may not have had any direct affect on the ultimate outcome of the conflict, the geoscience community stepped up aid in the United States in a time of national threat. ■

Letters to the Editor

To the HGS Editor, September 2013.

In the September HGS *Bulletin*, Jim Rine raised two points in his letter to the editor that require addressing. The first of his comments that I will address is his statement that "…this May scientifically recognized measurements of atmospheric CO_2 levels reached 400 ppm for the first time in at least 80,000 years." Oh the humanity! Unfortunately, Jim's comment is incorrect. From 1820 to 1840, atmospheric CO_2 levels were well over 400 ppm as a result of several major volcanic eruptions (**Figure 1**).

Furthermore, having atmospheric CO_2 levels above 400 ppm, or any other number, is meaningless unless there is a demonstrable correlation that increased atmospheric CO_2 levels cause increasing temperatures. The data, as pointed out in my HGS talk, show that increasing temperatures cause increasing CO_2 levels. The only place where there is a demonstrable correlation that increased atmospheric CO_2 levels cause increased temperatures is in General Circulation Computer Models, which are still a far cry from the real world, and most certainly are not data.

His second comment reads as follows: "The timing of the HGS's May letter describing the talk of R. C. Shoup (2/27/2013) ironically coincided with the publication of a survey which found 97% of some 4000 climate-scientists who published opinions on the cause of climate change, attributed it to human activities." This often quoted 97% consensus falls into that category of statistics that Mark Twain so famously warned us about. For those interested in the real consensus, I refer you to a column in Watts Up With That? 'Quantifying the consensus on global warming in the literature': a comment http://wattsupwiththat.com/2013/06/24/quantifying-the-consensus-on-global-warming-in-the-literature-a-comment/

I will address the fact that whether or not 97% of climate scientists actually do believe in a human-cause to global warming does not matter. The scientific method does not now, nor has it ever, relied on a majority vote.

The scientific method was perhaps best defined by Sir Karl R. Popper, noted scientific philosopher (Conjectures and Refutations):

1. It is easy to obtain confirmations, or verifications, for nearly every theory — if we look for confirmations.

2. Confirmations should count only if they are the result of risky predictions; that is to say, if, unenlightened by the theory in question, we should have expected an event which was incompatible with the theory — an event which would have refuted the theory.

3. Every "good" scientific theory is a prohibition: it forbids certain things to happen. The more a theory forbids, the better it is.

4. A theory which is not refutable by any conceivable event is non-scientific. Irrefutability is not a virtue of a theory (as people often think) but a vice.

5. Every genuine test of a theory is an attempt to falsify it, or to refute it. Testability is falsifiability; but there are degrees of testability: some theories are more testable, more exposed to refutation, than others; they take, as it were, greater risks.

6. Confirming evidence should not count except when it is the result of a genuine test of the theory; and this means that it can be presented as a serious but unsuccessful attempt to falsify the theory.

7. Some genuinely testable theories, when found to be false, are still upheld by their admirers — for example by introducing ad hoc some auxiliary assumption, or by reinterpreting the theory ad hoc in such a way that it escapes refutation. Such a procedure is always possible, but it rescues the

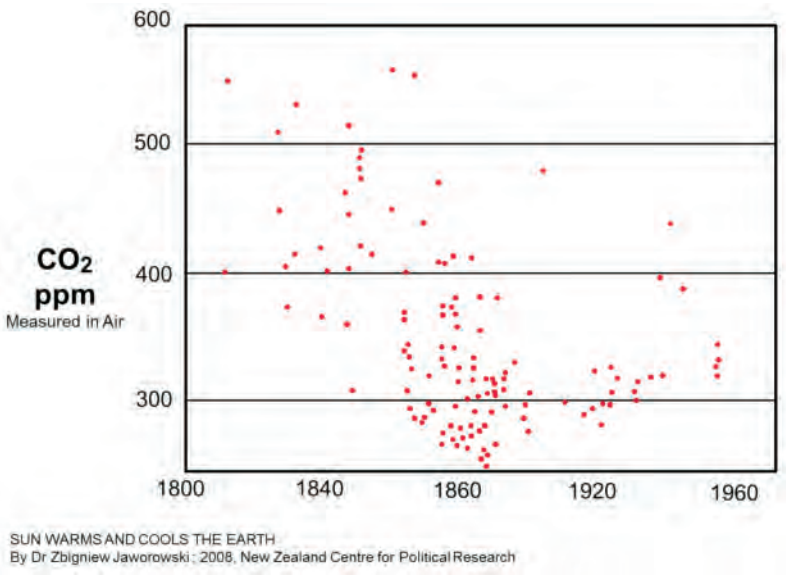


Figure 1: *Total Atmospheric CO_2*

theory from refutation only at the price of destroying, or at least lowering, its scientific status.

One can sum up all this by saying that the criterion of the scientific status of a theory is its falsifiability, or refutability, or testability (Popper's emphasis).

As pointed out in my talk at the HGS February lunch meeting (http://www.youtube.com/watch?v=6-9yJAPxf6Y) there are many aspects of the hypothesis of Anthropogenic Global Warming that are easily refuted. The hypothesis simply fails to hold up to scrutiny under the scientific method!

The timing of Jim Rine's letter ironically coincided with the announcement that Artic sea ice has expanded by more than 60% over last year's lows which have caused some members of the IPCC "to claim that the world is heading for a period of cooling that will not end until the middle of this century.

http://www.telegraph.co.uk/earth/environment/climatechange/10294082/Global-warming-No-actually-were-cooling-claim-scientists.html

I believe that individuals that call on HGS to be an organization that promotes scientific professionalism, should be professional enough in their own right to offer scientific evidence to back up their assertions.

Bob Shoup
Kuala Lumpur Malaysia

.....

To the Editor:

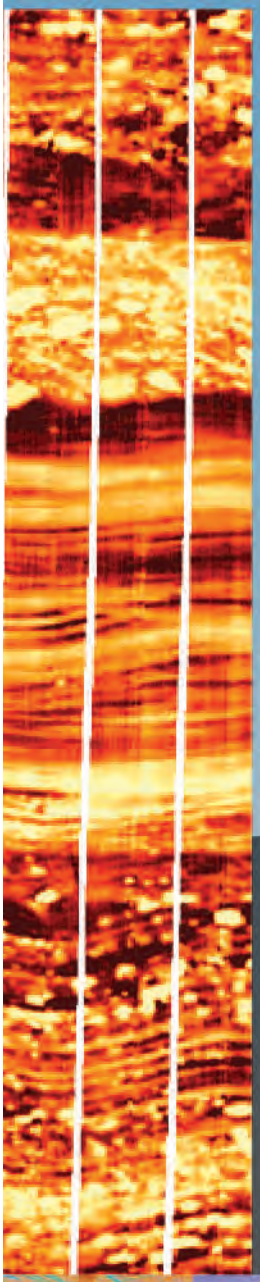
The HGS Board has proposed changing the HGS Bylaws with regard to Nominations for elective office (see "From the President" this issue).

I am very much in favor of this change.

John Tubb
Past HGS President.
Consulting Geologist

BOREHOLE IMAGING COURSE

Houston, Texas – 5TH, 6TH & 7TH FEBRUARY 2014



Hundreds of image logs have been acquired by US Oil companies in recent years. There is currently an important resource of image logs sitting in data archives. Images can provide unrivaled information of the geological structure, stratigraphy and sedimentology from the wellbore. The application of image logs in our industry has long been undervalued or not fully appreciated. The interpretation of images is a skill that needs to be learned and the best way to do so is with some of the industries' leading interpreters. Borehole images, both wireline and LWD can fill a vital data gap between core and seismic data.

Course aims...

- Carry out QC of borehole image data: wireline and LWD
- Design a borehole image logging program
- Provide a brief structural interpretation
- Classify major lithofacies types and sediment dispersal indicators
- Describe fractures and faults
- Appreciate limits of borehole images

Overview...

- Image log technology and practice
- Quality control
- Structural analysis
- Horizontal well analysis
- In-situ stress analysis
- Sedimentological characterization - in clastics and carbonate rocks.

Who should attend...

- Geologists, Petrophysicists & Geophysicists working with integrated reservoir models

Date...

- **5th, 6th & 7th February, 2014**

Venue...

- **Houston, Texas.**

Price...

- **US$ 2,500** *per attendee. Price includes lunch, coffee and snacks, course notes and exercises. Spaces are limited to 20 attendees and will be filled on a first-come, first-serve basis.*

DAY 1: Introduction: Borehole Image, Dipmeter and LWD acquisition and processing techniques, Log quality and artefact image recognition. **Structural Interpretation:** Basic principles - quick-look interpretation, Structural dip identification, unconformities, Large scale fault deformation structures. **Practical Exercise -** tectonic tilt, faults, unconformities.

DAY 2: Structural Interpretation: Fracture analysis. **Practical Exercise** - fracture analysis. Integration with surface seismic and production data. **Practical Exercise** - integration with seismic and production data. Analysis of borehole images in horizontal wells. **Sedimentological interpretation:** borehole image and dipmeter data.

DAY 3: Sedimentological Interpretation *(continued):* borehole images - clastic sequences. **Practical Exercise** - clastics. **Sedimentological interpretation:** carbonate sequences. **Practical Exercise -** carbonates. Approaches to permeability classification - carbonates; Petrophysical applications of image logs, *in-situ* stress analysis. **Practical Exercise -** *in-situ* stress analysis.

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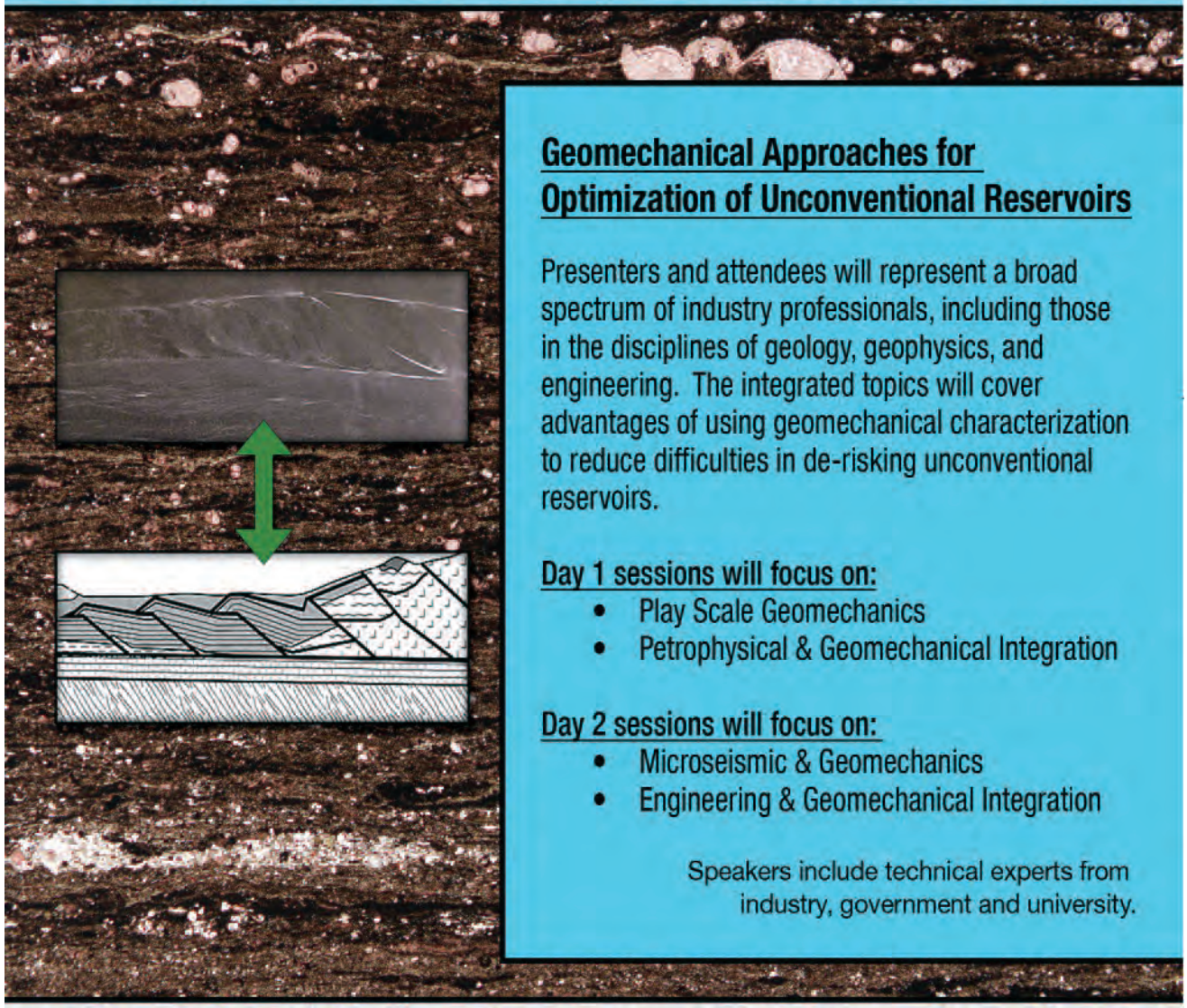

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Westin Memorial City, Houston, Texas

MONDAY, NOVEMBER 4, 2013

7:00 am Registration Opens.....Fourth Floor
7:00 am Breakfast.....Fourth Floor
8:00 am - 5:00 pm Technical (Oral)Sessions.....Fourth Floor, Azalea Room
11:35am - 1:00 pm **Poster Sessions**.....Fourth Floor, Cedar and Cypress Room
Invited Presentations from Industry and Academic Consortia
5:00 pm - 7:00 pm **Poster Sessions and Social Hour**.....Fourth Floor, Cedar and Cypress Room
Invited Presentations from Industry and Academic Consortia

PLAY SCALE GEOMECHANICS SESSION CHAIRS: HEATHER DAVEY & LANS TAYLOR	SESSION 1
8:00 - 8:10	*Opening Remarks*
8:15 - 8:50	Geomechanics: From Mantle Plume to Molecular Cohesion, What is the Scale of the Problem? *W. Lansing Taylor, Talisman, USA*
8:55 - 9:30	Geomechanics to Solve Structure-Related Issues in Petroleum Reservoirs *Laurent Maerten, Schlumberger*
9:35 - 10:10	Geomechanical Parameters and Their Impact on Exploration of Unconventional Resources, Saudi Arabia *Mohammed Ameen, Saudi Aramco*
10:10 -10:30	*Break*
10:30 - 11:05	Holistic Geomechanics Workflow *Dr. Amy Fox, Canadian Discovery, CANADA*
11:05 - 12:00	*Open Floor Discussion*
12:00 - 12:45	*Lunch Break*

KEYNOTE ADDRESS	
12:45-1:15	Shale Composition, In Situ Stress and Multi-stage Hydrualic Featuring *Mark Zoback, Stanford University*

PETROPHYSICAL & GEOMECHANICAL INTEGRATION SESSION CHAIRS: AMY FOX & GANG HAN	SESSION 2
1:15 – 1:50	Shale Rock Physics, Fractures, and Stress Changes Due to Production *Colin Sayers, Schlumberger*
1:50 - 2:25	TBA *Younane Abousleiman, University of Oklahoma, USA*
2:25 - 3:00	Experimental Geomechanics & Rock Physics Testing in Shale *Dave Dewhurst*
3:00 - 3:20	*Break*
3:20 - 3:55	Petrophysical & Geomechanical Integration *Roberto Suarez Rivera*
4:00 - 4:55	*Open Floor Discussion*

http://www.hgs.org

TUESDAY, NOVEMBER 5, 2013

7:00 am Registration Opens.....Fourth Floor
7:30 am Breakfast.....Fourth Floor
8:00 am - 5:00 pm Technical (Oral) Sessions.....Fourth Floor, Azalea Room
11:35am - 1:00 pm **Poster Sessions**.....Fourth Floor, Cedar and Cypress Room
Invited Presentations from Industry and Academic Consortia

MICROSEISMIC & GEOMECHANICS SESSION CHAIRS: ROBERT HURT & SCOTT WESSELS	SESSION 3
8:00 - 8:35	Integration of Reservoir Modeling and Forward MS Modeling for Unconventional Reservoirs *Tony Settari, Taurus Reservoir Modeling*
8:40 - 9:15	Spectral Characteristics of Tensile Microseismic Events *Dave Eaton, University of Calgary, CANADA*
9:20 - 9:55	Inferences from Microseismic Source Mechanisms *Michael Thorton*
10:00 - 10:20	*Break*
10:20 - 10:55	Unconventional Wisdom in Shale Oil/Gas Completions & Microseismic Interpretation *Neal Nagel, Itasca*
11:00 -12:00	*Open Floor Discussion*
12:00 -1:00	*Lunch*

ENGINEERING & GEOMECHANICAL INTEGRATION SESSION CHAIRS: PATRICK HOOYMAN & MIKE VAN HORN	SESSION 4
1:00 – 1:36	Integrated Fracture Mechanics Modeling *Robert Hurt, Baker Hughes, Houston, TX, USA*
1:40 - 2:15	Fracture Complexity Issues *Mike Vincent, Fracwell*
2:20 - 2:40	*Break*
2:45 - 3:20	Integration of Geomechanics with Completions & Production—Eagle Ford Formation *Dale Kokowski, Marathon Oil*
3:25 - 4:00	Brittle to Ductile Transition, Generation of Complex Fracture Networks and Engineering Implications *Reza Safari, Weatherford*
4:05 - 5:00	*Open Floor Discussion*

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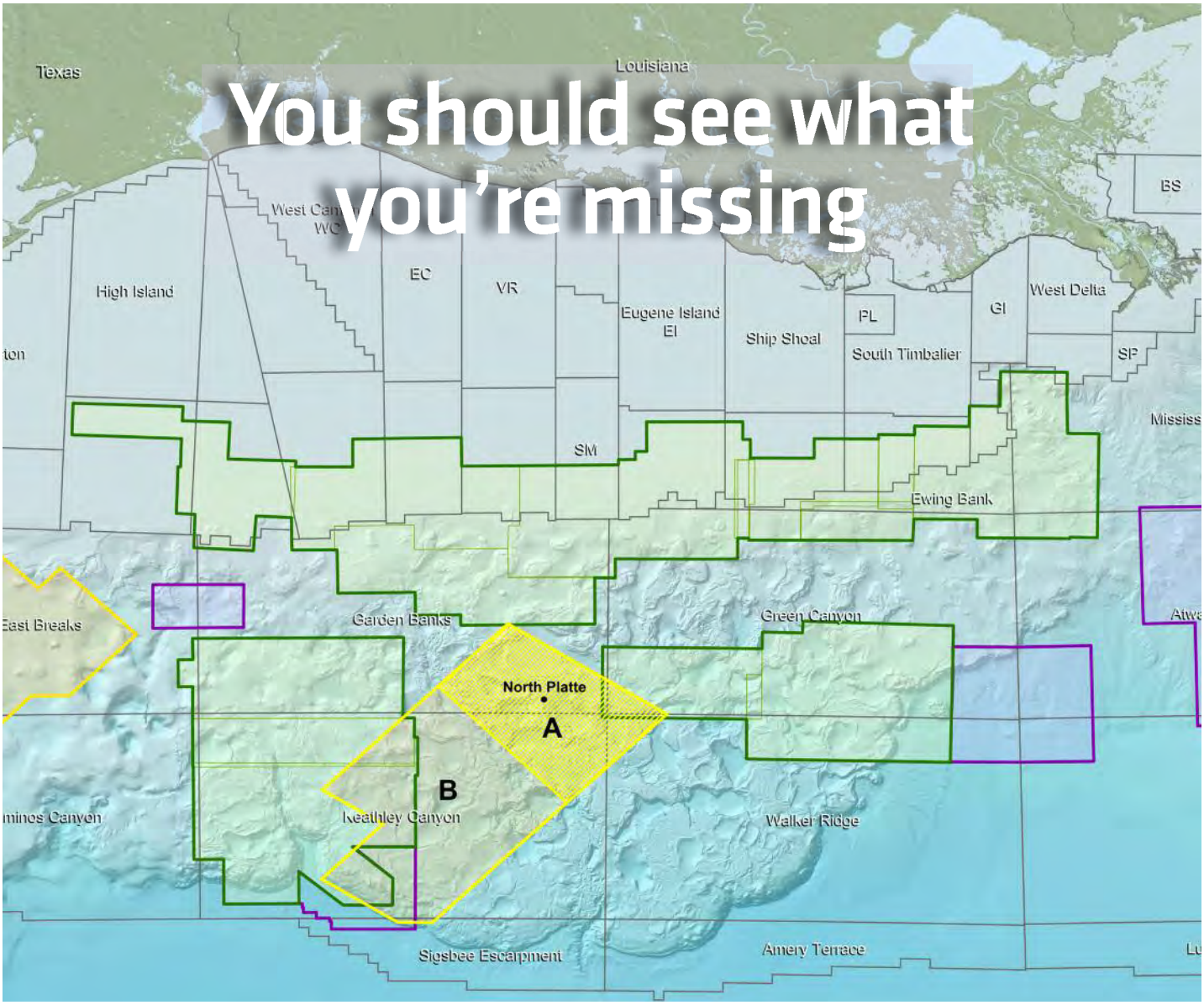

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Harry T. "Bud" Holzman, Jr.
U.S. Army (retired)

Iraq Hydrocarbon Potential

Iraq ranks right up at the top of hydrocarbon-rich countries worldwide with the potential to overtake any country in petroleum production. As an adviser for the U.S. Central Command in 2004, geological consultant and retired Army Officer Harry "Bud" Holzman was placed in charge of evaluating the entire Iraqi energy infrastructure system. This work involved everything from oil and natural gas to electricity and included an assessment of what the country has and how to rebuild it. He was charged with looking at everything from refineries and pipelines to electric power generation plants and to determine the real hydrocarbon reserves of Iraq.

Out of approximately 89 major fields discovered to date in Iraq, only 29 are producing. The others never really produced at all, yet some of them are classified as super-giant, each with over 12 billion barrels of proven reserves.

To understand why such a small amount of oil was being produced from such large reserves, Mr. Holzman talked to a number of Iraqi engineers. In 2004, several of these engineers informed him that they were only producing enough oil to reach their OPEC quota of 3.5 million barrels of oil per day. They could accomplish this with the production from just a few fields.

Vastly Underestimated Reserves

Mr. Holzman began his assignment by looking at the available captured data. With so many oil fields to study, he started on the East Baghdad Field because he was living just west of the field. The production at the time was only 1,100 barrels per day from this field. As the data review progressed, he realized that there were 16 billion barrels of oil sitting under his feet. The field has an anticlinal structure 110 kilometers long and 20 kilometers wide and has 10 pays, Cretaceous through Miocene. The field could produce a million barrels a day, but the existing infrastructure could only accommodate 25,000 barrels.

After reviewing data for numerous fields and conferring with Iraqi engineers, Mr. Holzman concluded that the total amount of oil and natural gas reserves in Iraq had been vastly underestimated. Based on his assessment of the available data, he estimated that there were 230 billion barrels in reserves in the 84 fields known at the time. Since then, a few new fields have recently been discovered in the Kurdish region with estimated reserves of 9 to 14 billion barrels of oil and 9 trillion cubic feet of gas. Additional review of the natural gas reserves, especially for the Akkas field in the Western Desert and unexplored regions of Kurdistan resulted in calculated reserves of 200-plus trillion cubic feet of natural gas. Most of the current gas production is being flared.

Studying the old figures for the nation-wide reserves of 115 billion barrels of oil and 100 trillion cubic feet of gas, Mr. Holzman asked Iraqi engineers and Oil Ministry officials what these figures were based on. The engineers said they just gave out the numbers from years ago and that they were told to say that. No one knew where the numbers originated. Since then, Iraq has revised upward its estimate of nation-wide reserves to 150 billion barrels of oil. There is good reason to believe that the reserves are even greater. Mr. Holzman asked an Iraqi engineer why there were so few Permian and Jurassic tests in the south of the country — the same reservoir formations that are so productive in Saudi Arabia and Kuwait. They had so much production coming out of the Cretaceous, the engineer just said, "why drill deeper? The deeper oil reserves will still be there in the future." Also, the Silurian, Jurassic, and Cretaceous source rocks of Iraq will one day be the target of oil companies. Some of the source rocks have a very rich total organic carbon content of 16 to 17 percent and underlie most of Iraq.

A World Leader?

There is a huge potential for Permian and Jurassic production in the southern part of Iraq and Cretaceous, Jurassic, Triassic, and Permian production in the north. The Paleozoic, Silurian, and Ordovician, will be productive in the west. Several major discoveries have recently been made in Kurdistan in the last two years. Out of the 3,000 wells drilled in Iraq (all vertical except one horizontal well completed in Kurdistan), less than 150 holes have been drilled into the Jurassic or deeper. Most wells are completed at depths less than 10,000 feet. There are few stratigraphic tests in the south. Huge reserves will likely be found along the western margins of the Gotnia Basin in southern and central Iraq, because oil migrates from east to west across the southern region.

HGS General Dinner *continued on page 25*


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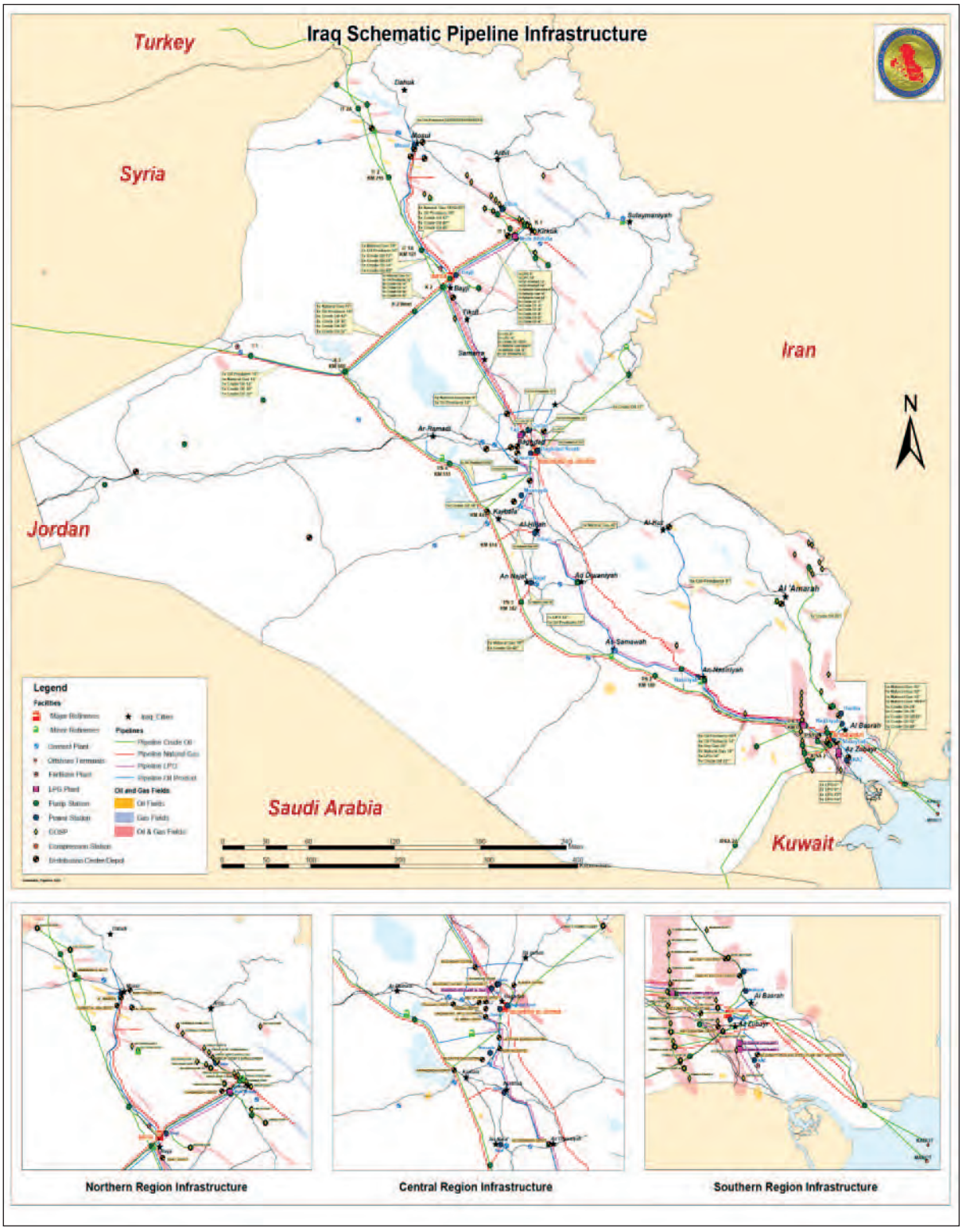
HGS General Dinner continued from page 23

A major obstacle to production in Iraq is the horrendous condition of the infrastructure. Most equipment has either been stolen or is broken, including pumping stations and compressors. Most of the water flood projects were broken down, especially in Kirkuk and the southern part of the country. The workers were re-injecting processed crude and residual oil back into the sands and carbonates because there was no other place to hold it. This procedure likely damaged the reservoirs. The other major obstacle is security,

HGS General Dinner *continued on page 27*



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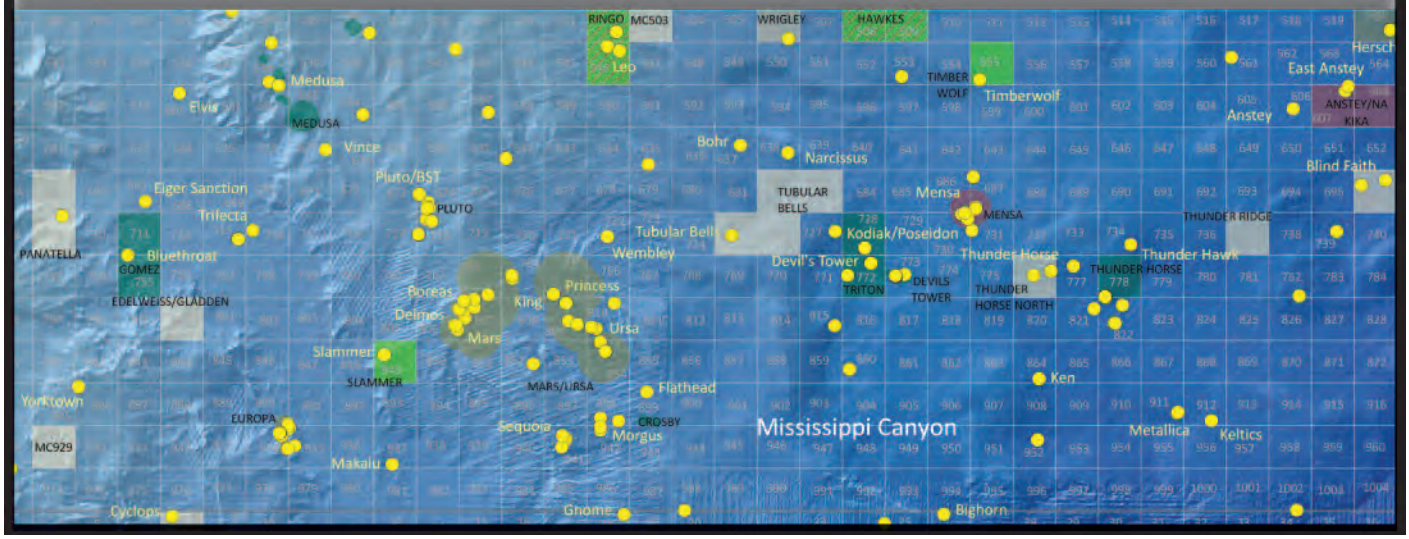


HGS General Dinner continued from page 25

especially in western, central, and southern Iraq, but the security situation in the Kurdish region is considerably better.

The key to increased Iraqi production is not in finding the oil, but in implementing administrative and logistical reforms. A first year geologist, engineer, and geophysicist could find oil in the major structural traps scattered across Iraq. In Kurdistan, the geology becomes a little more complex, with plate movement and some complex faulting. There are over 400 structures identified on 2-D seismic data that have not been drilled. This 2-D data was accumulated by majors and the Iraq government in the late fifties, sixties, and early seventies. Iraq needs an oil law. In 2007, this got bogged down in Iraqi politics and that's where it sits today — except in Kurdistan where they implemented their own oil law. The Kurdish and Baghdad governments have been discussing (fighting over) the oil law for years. If the Iraqi factions acted together, developed a good hydrocarbon law, and brought in the expertise of global service companies to repair the infrastructure, there is no reason then that the country could not overtake any place in the world in production. Iraq has the oil, and the exploration costs are extremely low.

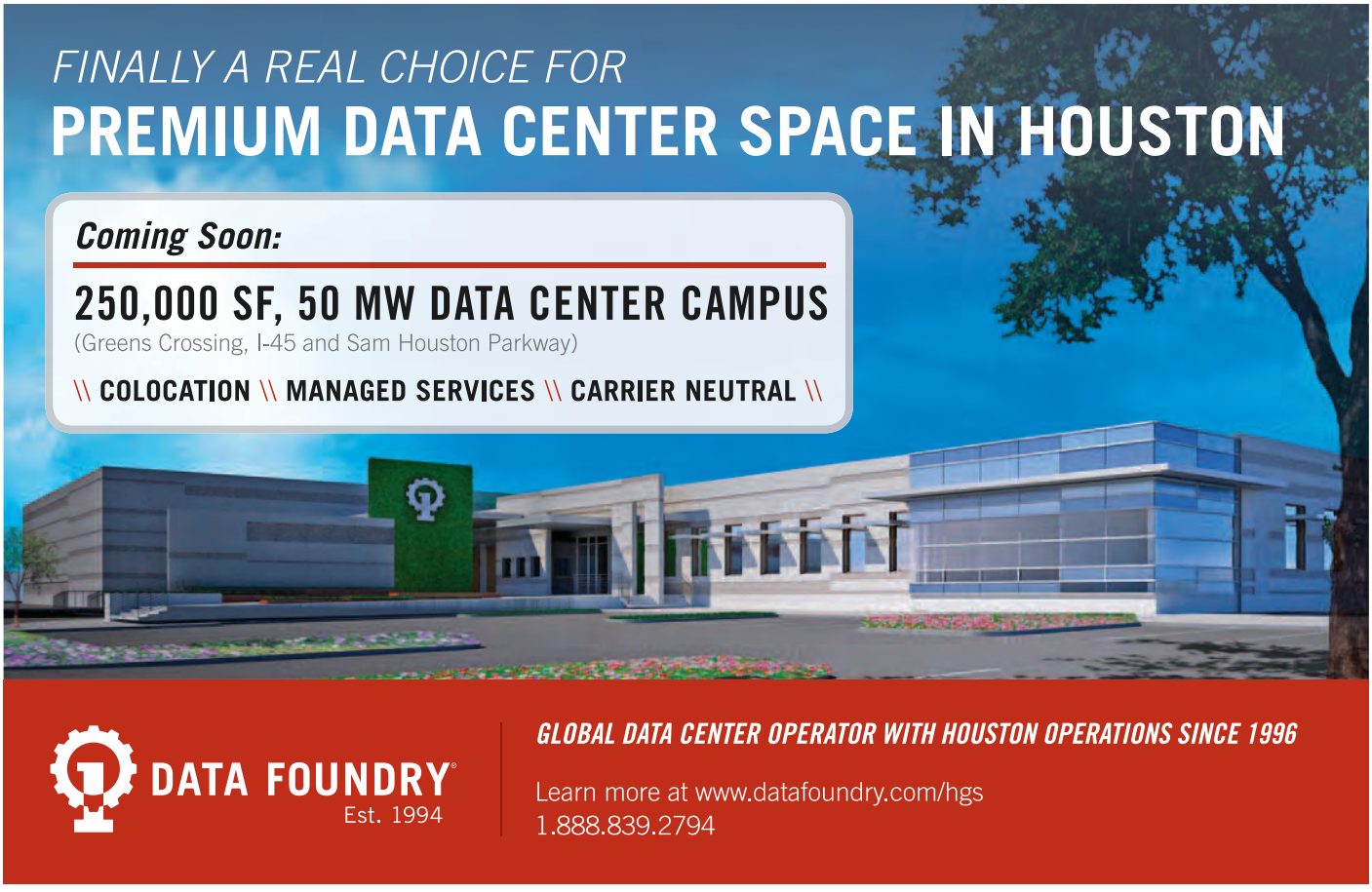
To put it into perspective, the country is the size of Texas with only approximately 3,000 wells drilled. The recent bidding process for service contracts to develop the large fields in Iraq was only somewhat successful. Most of the majors wanted to be involved in the future exploration of Iraq, even when it meant accepting marginal terms today on the development contracts. But the bidding for exploration blocks was not a success due to the poor terms offered by Baghdad. Kurdistan is doing far better in their effort to attract oil companies into their region due to the more favorable production sharing agreements offered for exploration blocks.

There are going to be great opportunities for both major and independent oil companies to become involved in both the development of current fields and the exploration for new reserves in Iraq. Oil-field service companies will be needed not just to repair but to also replace infrastructure. There is also a great need for up-to-date seismic and gravity surveys, given that most of Iraq hasn't been properly explored.

Geologic Wonderland

An added attraction for the rock hounds working the area: the geology is exciting. There is glacial geology in the west, deltas and salt in the south, and plate tectonics in the north. Everything a geologist learned in school can be put to use across Iraq. ■

HGS General Dinner *continued on page 52*



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Black Lab Pub, Churchill Room • 4100 Montrose Blvd.

Social 5:30 p.m., Dinner 6:30 p.m.

Cost: $30 Preregistered members; $30 non-members/walk-ups

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Pre-registration without payment will not be accepted.
Walk-ups may pay at the door if extra seats are available.

Anthony W. Gorody, Ph. D., P.G.
Universal Geoscience Consulting, Inc.

The Use of Stable Isotope Tracers to Address Groundwater Impacts of Oil and Gas Operations

Combined measurements of both dissolved element concentrations and stable isotope ratios are essential tools used to address potential groundwater impacts of oil and gas operations. When applied systematically, such measurements help to identify sources of impacted groundwater, to recognize source fluid mixtures, and to differentiate the effects of dilution from natural attenuation in response to remediation activities. Samples collected and analyzed for this purpose should represent end-member compositions of all potential fluid sources and any associated free and/or dissolved gases. These include water from domestic water wells, monitor wells, mud-logging samples collected while drilling, produced fluids, and any casing-head gases occurring at elevated pressures.

An example of a systematic approach for addressing sources of free and dissolved methane in groundwater includes using the following stable isotope analytical set: $\delta^{13}C_{methane}$, $\delta^{2}H_{methane}$, $\delta^{2}H_{water}$, $\delta^{18}O_{water}$, and $\delta^{13}C_{DIC}$.

- Stable isotope ratios of oxygen and hydrogen in water are used in conjunction with major ion and trace metal analysis to address hydrologic settings (e.g. source fluids derived from shallow versus. deeper aquifers or recharge versus. discharge zones).

- The stable isotope ratios of hydrogen in both water and dissolved methane are used to differentiate biogenic (via fermentation or CO_2 reduction) versus thermogenic sources, to identify end member stray gas source compositions, and to recognize enrichment fractionation of residual hydrocarbons associated with bacterially-mediated oxidation (natural attenuation).

- Stable isotope ratios of carbon and hydrogen in methane are used to identify contaminant sources and mixed methane sources, and to further verify enrichment fractionation of residual hydrocarbons associated with bacterially-mediated oxidation.

- The stable isotope ratio of carbon in dissolved inorganic carbon (DIC) is used to address contaminant gas sources containing measurable CO_2 and to recognize depletion fractionation associated with bacterially-mediated oxidation.

- In addition to stable isotope analyses, results derived from chromatographic analysis of fixed gases and hydrocarbons are also vital. For example, the presence of methane homologs larger than ethane, and gas composition parameters such as wetness, ethane/methane ratios, ethane/propane ratios, and butane and pentane isomer ratios are used together to identify the presence of stray thermogenic gas in samples and to recognize the effects of natural attenuation.

In addition to the stable isotope ratios of oxygen and hydrogen in groundwater, other stable isotope analyses are being developed to help address potential contaminant sources.

Because the groundwater environment intercepted by water wells interacts dynamically to affect stray gas sample composition as described, repeated sampling and analysis of both gas and groundwater sources are necessary components of all contaminant source gas investigations. Periodic sampling will satisfactorily reveal temporal trends that help differentiate the effects of mixing, dilution, and natural attenuation.

In addition to the stable isotope ratios of oxygen and hydrogen in groundwater, other stable isotope analyses are being developed to help address potential contaminant sources. Most recently, $^{87/86}Sr$ and $^{11/10}B$ analyses have been used to differentiate fluids derived from various Devonian aquifers in the Appalachian basin. Such analyses could be particularly useful when used in conjunction with measurements of dissolved Sr, B, Cl, and Br concentrations in groundwater to identify stray aqueous fluid sources in water wells. ■

HGS Environmental & Engineering Dinner *continued on page 31*

HGS - PESGB
13th Conference on African E&P
Africa: A World of Opportunities

September 9-10, 2014

The Westin Houston, Memorial City, 945 Gessner Road, Houston, Texas

Call For Papers, Posters, Sponsors and Exhibitors

In twelve years this conference has become established as a leading technical E&P forum on Africa, with attendance that can exceed 400. Participants include operators, service companies, consultants, governments and academia. The two day program of talks, technical posters and vendors' exhibits will be held on September 9-10, 2014 in Houston, Texas.

The conference, which alternates annually between London and Houston, is organized by the Houston Geological Society (HGS) and Petroleum Exploration Society of Great Britain (PESGB). The HGS-PESGB African Conference covers all aspects of African E&P, with particular emphasis on new ideas for plays and prospects, the geology of the continent and its conjugate margins, and application of emerging technologies.

Abstracts (~200 words) should be submitted as soon as possible but no later than March 15, 2014 to the technical committee, Africa2014@hgs.org. The program will be finalized by the end of April.

Currently, volunteers are being sought to be proactive Session Chairs and anyone interested should contact the Technical Committee as soon as possible.

Details of sponsorship opportunities and display booths are available from the HGS office. To become a sponsor or inquire about exhibit space, contact sandra@hgs.org

Registration will be available from April 2014and Early Bird benefits will apply for a few weeks.

Further details will appear in the HGS and PESGB bulletins and on their websites, www.hgs.org and www.pesgb.org.uk.

Conference Committee for 2014:
Martin Cassidy (chair), Al Danforth, Ian Poyntz, Donna Davis and Sandra Babcock (HGS)
Ray Bate and Duncan Macgregor (PESGB).

HGS Environmental & Engineering Dinner

continued from page 29

Biographical Sketch

Anthony W. Gorody is a forensic geoscientist with 30 years of diverse international and domestic industry experience dedicated to evaluating groundwater and natural gas resources. An industry leader in baseline environmental measurement and monitoring programs, Dr. Gorody provides training and consulting services for assessing technical and environmental risks related to the acquisition, drilling, and development of both unconventional and conventional natural gas properties. In that capacity, he is a technical advisor and consultant to oil and gas producers, state and federal regulators, and community development groups. He maintains working relationships with many of the largest environmental service companies in the Rocky and Appalachian mountain areas.

Dr. Gorody's forensic expertise relates to state-of-the-art geochemical fingerprinting, sampling, and analytical techniques needed to address sources of groundwater contamination and the effectiveness of remediation methods. In association with Ellington and Associates Inc., he provides the only on-site third party mud-logger auditing services available in the United States.

Dr. Gorody is licensed as a professional geologist in Texas, Pennsylvania, and Wyoming. His experience is based on projects conducted in the Washakie, Wind River, Powder River, Green River, San Juan, Raton, Piceance, Denver-Julesberg, Fort Worth, Rio Grande, Black Warrior, and Appalachian basins, and the Gulf Coast Tertiary, deep Gulf of Mexico, and the San Rafael Swell. His experience in international projects includes the Persian Gulf, North Sea, Baltic, Telkwa (BC), Comox (BC), and Hat Creek (BC) Basins.

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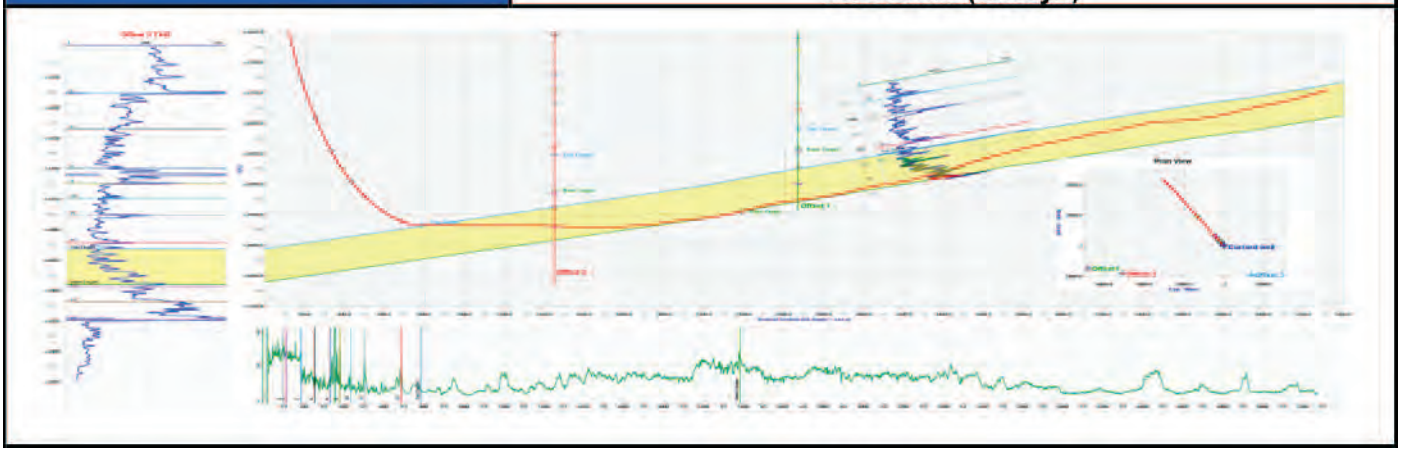

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Monday, November 18, 2013

HGS Joint International and North American Dinner Meeting

Westchase Hilton • 9999 Westheimer
Social Hour 5:30–6:30 p.m.
Dinner 6:30–7:30 p.m.

Cost: $30 Preregistered members; $35 non-members/walk-ups

To guarantee a seat, pre-register on the HGS website & pre-pay by credit card.
Pre-registration without payment will not be accepted.
Walk-ups may pay at the door if extra seats are available.

Cindy A. Yeilding
Vice President and Director
Gulf of Mexico Appraisal, BP

The Robert E. Sheriff Lecture Series

Sponsored by University of Houston Department of Earth and Atmospheric Sciences and U.H. Geoscience Alumni Association

In addition to the presentation by a guest speaker, Dr Hua-wei Zhou, Department of Earth and Atmospheric Sciences Chairman, will present an update of activities at U.H. There will be posters and presentations on current thesis and dissertation research of U.H. graduate students. Volunteers from the UHGAA will judge the student posters.

Come and meet the next generation of geoscientists from the University of Houston!

The Robert E. Sheriff Lecture Series was initiated in 1999 by the University of Houston Geoscience Alumni Association to honor Dr. Sheriff as an educator, scholar, and proponent for the geosciences. For the past several years the series has been co-sponsored by the International Explorationists Group of the Houston Geological Society.

Its mission is to
bring some of the best known geologists and geophysicists in the world to the Houston community in order to share ideas highly relevant to exploration geology and geophysics, and to showcase geoscience activity at the University of Houston.

A full list of the Student Posters will be available at the HGS Website.
Check the HGS Calendar event for the current list of Student Posters.

Thanks to Swift Energy and BP for their Financial Support

R.E. Sheriff Lecture: What a Difference a Few Decades Makes: Exploration History of the US Gulf of Mexico Deepwater

Exploration in the U.S. Gulf of Mexico has been ongoing since the first successful offshore well in the 1940s. "Deepwater" exploration began in the 1970s, with success in the upper slope Flex Trend in the late 1970s-early 1980s. Industry moved into deepwater (water depths greater than 1000 feet) en masse with the 1985 area-wide Outer Continental Shelf lease sales. Since 1980, the Gulf of Mexico has produced approximately two to three million barrels of oil per day and the Gulf of Mexico currently supplies approximately 20 to 25 percent of United States' domestically produced oil. The Deepwater Gulf of Mexico currently contributes over half of this production.

Early exploration yielded success in a number of seismic attribute-related upper Miocene and younger discoveries. The second phase of drilling focused on older Miocene stratigraphy and on testing robust structural culminations, many of which were partially or completely subsalt. Most recent drilling activity has yielded a series

HGS Joint International and North American Dinner *continued on page 35*


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HGS Joint International and North American Dinner

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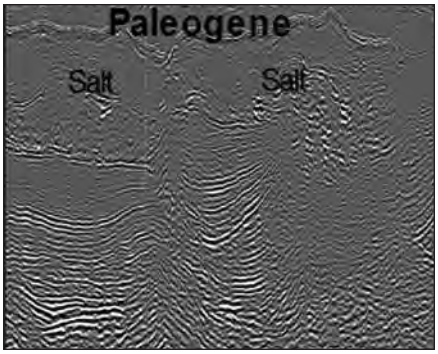

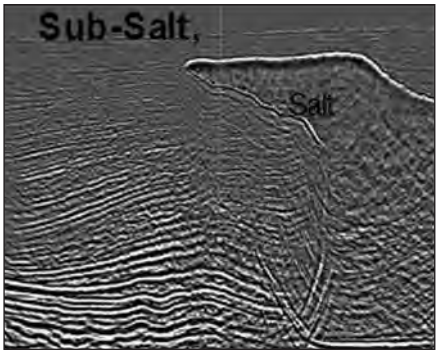

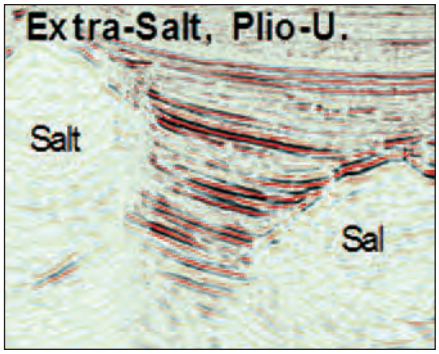

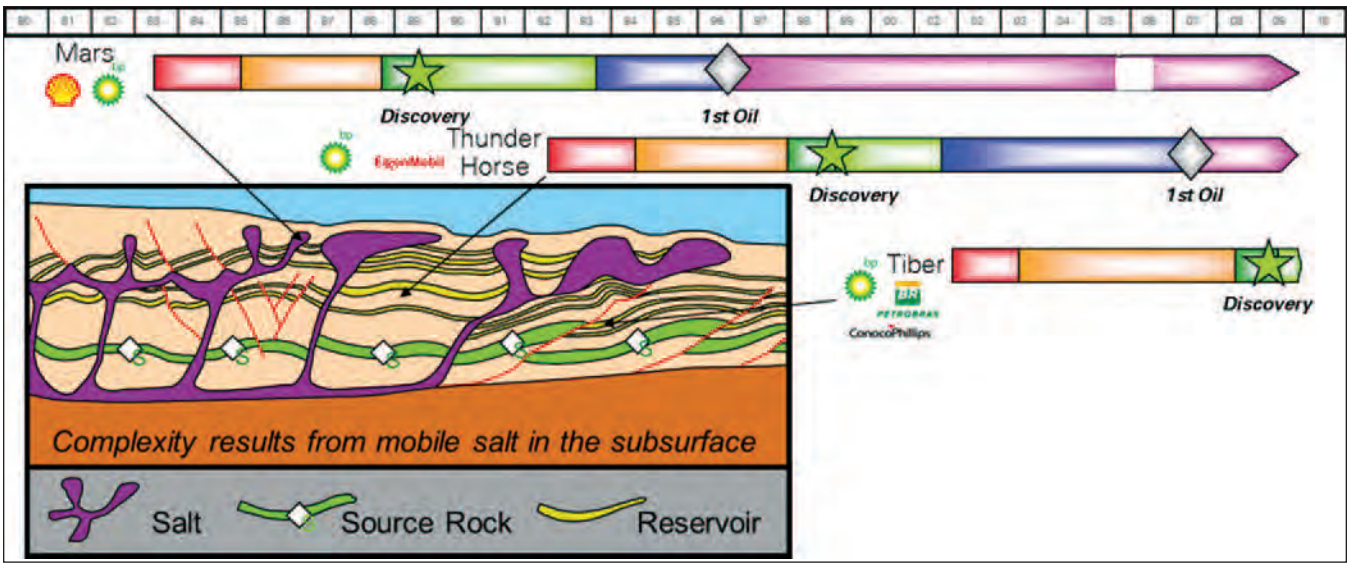

of oil discoveries in the Paleogene (Lower Tertiary) strata of the deepwater, and industry is currently testing the Paleogene play northwards as it targets deep gas trends under the shallow-water Gulf of Mexico shelf.

Technology has played a critical role in the exploration, appraisal, and development of these discoveries. Early exploration in the basin was done on sparse 2D seismic, quickly moving into area-wide 3D speculative seismic shoots which collectively span most of the central and western Gulf of Mexico. This geophysical database is currently being refreshed by a new generation of multi-azimuth data which is yielding significant improvements in imaging. Drilling, completion and production technologies are continually moving forward, with the Gulf of Mexico playing a significant role in driving deepwater technology development for our "high-tech" industry. ■

Biographical Sketch

Cindy Yeilding earned her Master of Science degree from the University of North Carolina after receiving a Bachelor of Science degree in geology from Southern Methodist University. She has worked as an exploration, production, appraisal, and well site operations geoscientist and is currently BP's Vice President and Director of Appraisal, Gulf of Mexico. Her most recent roles include Vice President for Exploration for GoM, Chief Geoscientist for the GoM, Global Geoscience Technology and R&D Manager, and she has held numerous other exploration and technology leadership positions in the Americas.

Ms. Yeilding has developed and led short courses and geological field seminars, chaired numerous technical sessions and presented many technical talks. She has served as an AAPG (American Association of Petroleum Geologists) Distinguished Lecturer and was named a "Legend in Exploration" by AAPG in 2003. Ms. Yeilding is also a member of the Offshore Technology Conference (OTC) Board of Directors and BP Executive Sponsor for the Katy Relay for Life.

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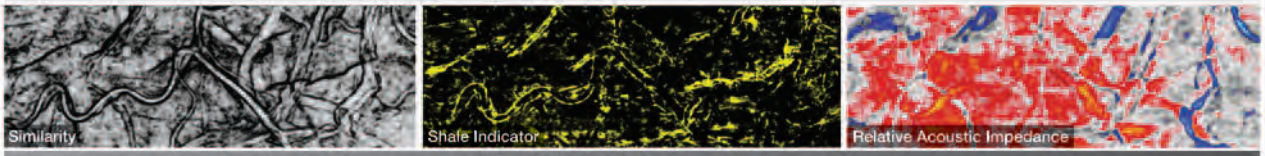

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Tuesday, November 19, 2013

Hyatt North Houston (former Crowne Plaza Hotel - Greenspoint)
425 North Sam Houston Pkwy E

Social 11:15 AM, Luncheon 11:30 AM

Cost: $31 pre-registered members; $35 for non-members/walk-ups

To guarantee a seat, pre-register on the HGS website & pre-pay by credit card.
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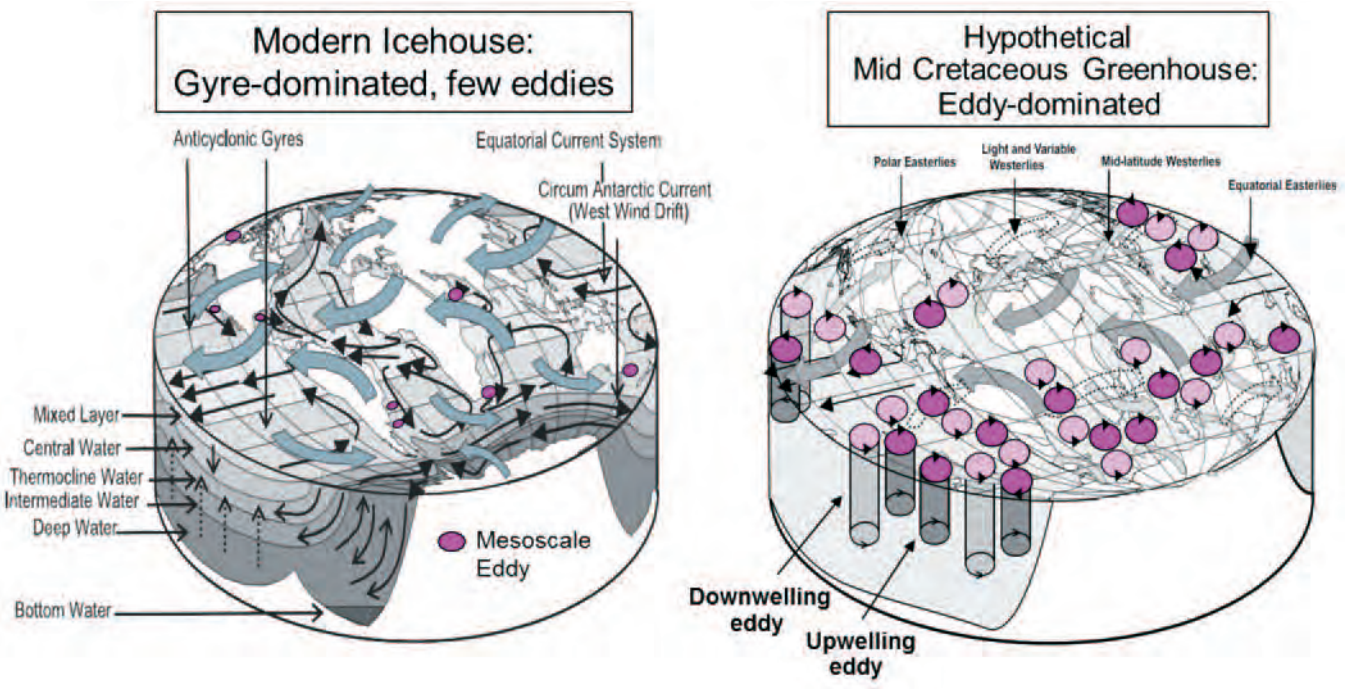
HGS Northsiders Luncheon Meeting

Lowell E. Waite (speaker)
Pioneer Natural Resources Co., Irving, Texas
William W. Hay
Department of Geological Sciences, University of Colorado at Bolder, Estes Park, Colorado
Paul R. Clarke
Pioneer Natural Resources Co., Irving, Texas

Total Organic Carbon Trends within the Eagle Ford of South Texas: Sub-Mesoscale Vortices and the Eddy Ocean Hypothesis



Total organic carbon (TOC) is a critical component of hydrocarbon source rocks within unconventional shale plays. Regions of higher TOC often show a strong positive correlation to well performance and hydrocarbon reserves and therefore prediction of TOC is important to increased economic success. Areas of high TOC deposition in modern oceans are regulated by global atmospheric and oceanic circulation patterns that foster high oxygen levels throughout the global water mass.

The present-day icehouse climate with polar ice caps generates cold, dense water masses and thermal "fronts" that effectively limit the development of anoxia to intermediate waters at lower latitudes. Regions of high TOC in today's oceans are mainly limited to anoxic basins and to regions of local upwelling and enhanced productivity along the western margins of the continents. However a few seasonally stable cyclonically rotating, mesoscale (10 – 100 km diameter) eddies provide a local mechanism to pump nutrient-rich water bottom waters upward, promoting phytoplankton blooms at the surface.

Theoretical considerations of an ice-free Cretaceous world suggest that atmospheric-oceanic conditions were far more conducive to the formation and prevalence of mesoscale eddies, some of which

HGS Northsiders Luncheon *continued on page 39*

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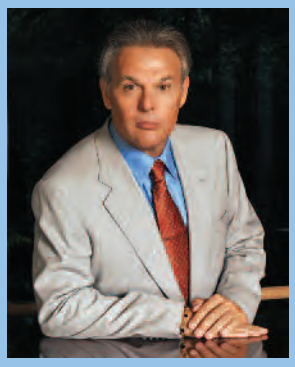

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HGS Northsiders Luncheon continued from page 37

were stable, throughout the world oceans. Computer models of the Late-Cretaceous North Atlantic support the hypothesis of a so-called "eddy ocean," with numerous mesoscale to sub-mesoscale upwelling vortices indicated along the southern margin of the Western Interior Seaway of North America. Mapped distribution patterns of TOC within the Eagle Ford Shale of south Texas are consistent with deposition by multiple sub-mesoscale eddies. An eddy-dominated ocean replete with sub-mesoscale vortices may explain local producing trends within the Eagle Ford and has implications for regional reserve estimates throughout the play. The eddy ocean hypothesis may have application to other Phanerozoic greenhouse ocean systems. ■

Biographical Sketch

Lowell Waite is currently a Geologic Specialist with Pioneer Natural Resources in Irving, TX. He has 32 years of experience as a geologist in the oil and gas industry. He holds a Bachelor of Science degree with a geology major from the University of Michigan, Ann Arbor, Michigan, and a Master of Science degree in geology from the University of Texas at Arlington. From 1981-1997, he was employed by Mobil Oil, where he held a number of positions in carbonate research and domestic and international exploration. Mr. Waite joined Pioneer Natural Resources in 1998, where he is currently a member of the New Plays and Shale Technology Team.

His main professional interests include carbonate sedimentology/stratigraphy, biostratigraphy, and petroleum systems. Lowell is a member of the American Association of Petroleum Geologists, the Geological Society of America, and the Society of Exploration Paleontologists and Mineralogists.

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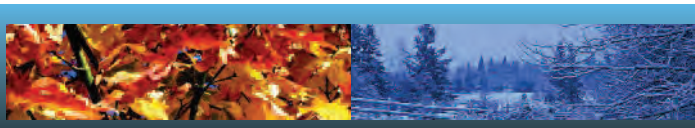
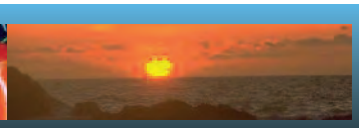
www.aapg.org/gtw/2014/houston/index.cfm

AAPG | Geosciences Technology Workshops 2014

November 2013



Sunday	Monday	Tuesday	Wednesday
	Reservations: The HGS prefers that you make your reservations on-line through the HGS website at www.hgs.org. If you have no Internet access, you can e-mail reservations@hgs.org, or call the office at 713-463-9476. **Reservations for HGS meetings must be made or cancelled by the date shown on the HGS Website calendar, normally that is 24 hours before hand or on the last business day before the event.** If you make your reservation on the Website or by email, an email confirmation will be sent to you. If you do not receive a confirmation, check with the Webmaster@hgs.org. Once the meals are ordered and name tags and lists are prepared, no more reservations can be added even if they are sent. **No-shows will be billed.**		**You can make your reservations NOW online at ww.hgs.org**
3	4 **HGS Applied Geoscience Conference Interdisciplinary Micro to Macroscale Geomechanics** *Houston, Texas* *Page 18*	5 **HGS Board Meeting** *6 p.m.*	6
10	11 **HGS General Dinner Meeting** *"Iraq Hydrocarbon Potential," Harry T. "Bud" Holzman, Jr.* *Page 23*	12 **HGS Environmental & Engineering Dinner Meeting** *"The Use of Stable Isotope Tracers to Address Groundwater Impacts of Oil and Gas Operations," Anthony W. Gorody, Ph.D., P.G., Universal Geoscience Consulting, Inc., Page 29*	13
17	18 **HGS Joint International & North American Dinner R. E. Sheriff Lecture:** *"What a Difference A Few Decades Makes: Exploration History of the U.S. Gulf of Mexico Deepwater," Cindy A. Yeilding, Vice President and Director, Gulf of Mexico Appraisal, BP, Page 33*	19 **HGS Northsiders' Luncheon** *"Total Organic Carbon Trends with the Eagle Ford of South Texas," Lowell E. White, Pioneer Natural Resources Company* *Page 37*	20
24	25	26	27

GeoEvents

Thursday	Friday	Saturday
Members Pre-registered Prices: General Dinner Meeting..... $30 Nonmembers & walk-ups ..... $35 Env. & Eng. ..... $30 Luncheon Meeting ..... $30 Nonmembers & walk-ups ..... $35 International Explorationists ..... $30 North American Explorationists $30	1	2
7	8	9
14	15	16
21	22	23
28 Thanksgiving HGS office closed	29 HGS office closed	30

November 8-10, 2013
Houston Gem and Mineral Society
60th Annual Show
Humble Civic Center, Humble, TX

November 12, 2013
LNG Export: Is it Good for the US?
Energy Symposium Series
University of Houston

December 3-6, 2013
National Groundwater Association
Expo
Nashville, TN

December 9-13, 2013
AGU Fall Meeting
San Francisco, CA

January 28-28, 2013
Fifth Annual AAPG-SPE Deepwater
Reservoirs Geosciences Technology
Workshop
Norris Conference Center
Houston, TX

February 10-12, 2014
Arctic Technology Conference
Houston, TX

February 17-18, 2014
HGS Applied Geoscience Conference
Integrated Approaches of
Unconventional Reservoir
Assessment and Optimization
Houston, TX

March 22-23, 2014
Natural Gas Hydrate Systems –
Occurrence and Dynamic Behavior
Gordon Research Seminar
Galveston, TX

April 6-9, 2014
AAPG Annual Convention &
Exhibition
Houston, TX

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Getting Started in Fluvial Stratigraphy Houston, TX (with AAPG Annual Meeting)	April 5, 2014
Applied Concepts in Naturally Fractured Reservoirs Houston, TX (with AAPG Annual Meeting)	April 5-6, 2014
Concepts, Models, And Case Studies Of Dolomitization Houston, TX (with AAPG Annual Meeting)	April 5-6, 2014
Basic Well Log Analysis Austin, TX	April 28-May 2, 2014

Field Seminars

Field Safety Course for Field Trip Leaders Houston, TX	March 26-27, 2014
Basinal to Local Scale Stratigraphy and Facies Architecture of the Jackfork Group Turbidites, Arkansas Little Rock, AR (just prior to AAPG Annual Meeting)	April 3-5, 2014
Modern Terrigenous Clastic Depositional Systems South Carolina	April 10-17, 2014
Deep-Water Siliciclastic Reservoirs California	April 11-16, 2014

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TECHNICAL PROGRAM

MONDAY, FEBRUARY 17, 2014

7:00 am	Registration Opens……Fourth Floor
Breaks & Social Hour	**Core Display**…..……..……Fourth Floor, Pecan and Pine Rooms *Selected Core from Emerging and Established Unconventional Reservoirs*
8:00 am - 5:00 pm	Technical Talks (Oral)Sessions……..……Fourth Floor, Azalea Room
11:35am - 1:00 pm	**Poster Sessions**……..….Fourth Floor, Cedar and Cypress Rooms *Invited Presentations from Industry and Academic Consortia*
5:00 pm - 7:00 pm	**Poster Sessions and Social Hour**……..……....Fourth Floor

MORNING — *DAY 1*

OUTCROP TO SUBSURFACE CHARACTERIZATION / MESOZOIC — ***SESSION 1***	
SESSON CHAIRS: FRANK WALLES / JOHN BREYER	
8:00 - 8:10	***Opening Remarks***
8:10 - 8:45	Eagle Ford/ Boquillas BEG Talk *Steve Ruppel, University of Texas*
8:45 - 9:20	State of Stress in the Marcellus Based on Minifrac Tests *Terry Engelder,The Pennsylvania State University, PA*
9:20 - 9:55	Niobrara Outcrop to Subsurface *Bill Drake, Pioneer*
9:55 - 10:25	***Coffee Break***

OUTCROP TO SUBSURFACE CHARACTERIZATION / PALEOZOIC — ***SESSION 2***	
SESSON CHAIRS: MIKE CAMERON / ERIK KVALE	
10:25 - 11:00	Utica Shallow Subsurface to Subsurface *Tina Gammill, Anadarko*
11:00 - 11:35	Regional Upwelling During Late Devonian Woodford Deposition in Oklahoma and Its Influence on Hydrocarbon Production and Well Completion *Erik Kvale, Devon Energy*
11:35 - 1:00	***Lunch Break***

Poster Sessions

Invited Presentations from Industry and Academic Consortia

View them Monday from
11:35 am - 1:00 pm
During Social Hour…..5:00 pm - 7:00 pm

Cedar and Cypress Rooms……..……..Fourth Floor

Core Display.....

Selected Core from Emerging and Established Unconventional Reservoirs Supporting the Oral Technical Presentations

Open during Coffee and Lunch Breaks

Pecan and Pine Rooms.....Fourth Floor

AFTERNOON — *DAY 1*

EMERGING PLAYS / MESOZOIC — ***SESSION 3*** **SESSION CHAIRS: MIKE VAN HORN / GRETCHEN GILLIS**	
1:00 - 1:35	Unita Basin, Utah *Newfield TBD*
1:35 - 2:10	Colombia La Luna / Gachetta—Middle Magdalena, Llanos, and Catatumbo Basins *Dr. Joel Walls, INGRAIN*
2:10 - 2:45	Unconventional Targets in Saudi Arabia *Brian Gratto, Saudi Aramco*
2:45 - 3:15	***Coffee Break***

EMERGING PLAYS / PALEOZOIC — ***SESSION 4*** **SESSION CHAIRS: OBIE DJORDJEVIC / ROB BEFUS**	
3:15 - 3:50	Resource Potential of the Wolfcamp-Cline and Other Formations in the Permian Basin *Jackie Reed, Reed Geochemical Consulting*
3:50 - 4:25	Duvernay *Raphael Wust, Trican*
4:25 - 5:00	Mississippian Lime KS/OK - Hybrid Conventional / Unconventional Components of the Inner Ramp Areas *Dr. Evan K. Franseen, University of Kansas*

SOCIAL HOUR

Monday from 5:00—7:00 PM

FOURTH FLOOR

TECHNICAL PROGRAM

2014 Applied Geoscience Conference
Westin Memorial City, Houston, Texas

TUESDAY, FEBRUARY 18, 2014

7:00 am	Registration Opens…..……...…..……...……..…..……Fourth Floor
Breaks & Social Hour	**Core Display**…..……...……Fourth Floor, Pecan and Pine Rooms
	Selected Core from Emerging and Established Unconventional Reservoirs
8:00 am - 5:00 pm	Technical Talks (Oral) Sessions……..…..……Fourth Floor, Azalea Room
11:35am - 1:00 pm	**Poster Sessions**……..…….....….Fourth Floor, Cedar and Cypress Rooms
	Invited Presentations from Industry and Academic Consortia

MORNING — *DAY 2*

MUDROCK SYSTEMS CHARACTERIZATION - RESERVOIR INSIGHTS FOR INTEGRATION — *SESSION 5* **SESSON CHAIRS: TARAS L. BRYNDZIA / WAYNE CAMP**	
8:00 - 8:10	***Opening Remarks***
8:10 - 8:45	Microbial Relationships to TOC Original Elemental Suite Controls *Michael Tice, Texas A&M*
8:45 - 9:20	Mudrock Subsurface Diagenesis—Impact and Attributes *Aysen Ozkan, Shell*
9:20 - 9:55	Chemostratigraphy,Biostratigraphy, Lithostratigraphy, and Sequence Stratigraphy of the Eagle Ford *Harry Rowe, BEG*
9:55 - 10:25	***Coffee Break***

MUDROCK SYSTEMS CHARACTERIZATION - NEW GEOPHYSICAL INSIGHTS — *SESSION 6* **SESSION CHAIRS: BRUCE HART / PAUL COLLINS**	
10:25 - 11:00	Barnett—Full Integration of Geophysical Characterization Through Microseismic *TBD*
11:00 - 11:35	Full Integration Case Example *TBD*
11:35 - 1:00	***Lunch Break***

Poster Sessions

Invited Presentations from Industry and Academic Consortia

11:35 am - 1:00 pm

Cedar and Cypress Rooms……..……..Fourth Floor

Core Display.....

Selected Core from Emerging and Established Unconventional Reservoirs Supporting the Oral Technical Presentations

Open during Coffee and Lunch Breaks

Pecan and Pine Rooms.....Fourth Floor

AFTERNOON — *DAY 2*

RESERVOIR CHARACTERIZATION TOWARDS OPTIMIZED STIMULATION AND PRODUCTION — ***SESSION 7***	
SESSION CHAIRS: RANDY LAFOLLETTE / JOEL GEVIRTZ	
1:00 - 1:35	How Many Fracs Are Producing in My Horizontal Well *David Craig, Reservoir Development*
1:35 - 2:10	Duvernay vs EagleFord *Dr. Marc Bustin, University of British Colombia*
2:10 - 2:45	Diagnostics for Evaluating Production within Unconventional Laterals *Stuart Cox, Marathon Oil*
2:45 - 3:15	***Coffee Break***

RESERVOIR CHARACTERIZATION TOWARDS OPTIMIZED STIMULATION AND PRODUCTION — ***SESSION 8***	
SESSION CHAIRS: SUNIL GULRAJANI / GREG GETZ	
3:15 - 3:50	Regional PVT Consideration for Unconventional Liquid Production *Kevin Ferworn, GeoMark*
3:50 - 4:20	Reservoir Reach– How Do We Utilize Reservoir Characterization and Put It All Together for Enhanced Producibility for Specific HC Phases *Mark Papa, EOG Resources*
4:20 - 4:50	Custom Completion Approaches Based Upon Improved Reservoir Characterization *Brain Clark, Schlumberger*

2014 HGS APPLIED GEOSCIENCE CONFERENCE TECHNICAL COMMITTEE

Frank Walles–Talisman Energy
David Tonner–Weatherford
Paul Collins–Statoil
Randy LaFollette–Baker Hughes
Amy Garbowicz–Shell
Erik Kvale–Devon Energy
Wayne Camp–Anadarko
Bruce Woodhouse - Conestonga-Rovers
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Ashley Garcia–ION
Mike Cameron–Hess
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Reception - $5,000
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Lunch - $2,500
Availability: 4 of 5

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Wifi - $1,500
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Coffee - $1,000
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Geological Website of the Month

American Museum of Natural History
www.amnh.org

By Michael F. Forlenza, P.G.

Geologists always look forward to an interesting field trip. They enjoy seeing familiar favorite outcrops and exposures and to visiting less explored formations. But there are times when the weather is inclement or even hostile. Outdoor excursions are less enjoyable when a cold rain soaks through one's anorak and cotton socks become squishy. These are the perfect days for an indoor field trip. For me, when an an indoor geology field trip is in order, there is no better destination than the American Museum of Natural History (AMNH) on New York City's Central Park West at 79th Street. This is one of my favorite places in the world.

The AMNH is an institution that every geologist should visit. The fossil, gem, and mineral collections and displays are among the finest in the world. The fossil displays span the history of life on Earth through six large halls. The rock stars of the fossil collections are the exciting mounted dinosaur exhibits. These include the important, historic, and well-preserved *Tyrannosaurus rex* skull discovered by Barnum Brown in 1902 in the Hell Creek Formation in Montana.

The stunning gem and mineral displays include the Star of India. At 563 carats, the Star of India is the world's largest gem-quality blue sapphire. Some two billion years old, it is also one of the most well-known objects in the world.

Among the other areas of interest to geologists are the Arthur Ross Hall of Meteorites, Harry Frank Guggenheim Hall of Minerals, David S. and Ruth L. Gottesman Hall of Planet Earth, Hayden Planetarium, and Rose Center for Earth and Space. The extensive halls of life-like displays of North American Mammals, African Mammals, Asian Mammals, and Primates are the *ne plus ultra* of naturalistic dioramas. Do not miss the gray wolves (*Canis lupus*) dashing across the fresh Minnesota snow at midnight under the eerie glow of the aurora borealis.

An all-day visit to the AMNH will give the interested naturalist just a taste of the vast treasures and fascinating displays arrayed on three floors.

If you cannot make the trip to New York City, then the next best option is the website for the AMNH (www.amnh.org). The homepage for the AMNH is a somewhat abbreviated arrangement in blue and gray with large rotating photo section near the top and a few pull down menus. These pull down menus are: Plan Your Visit, Exhibitions, Learn & Teach, Explore, Our Research, Calendar, Join & Support, and Buy Tickets. Each of these pull down menus leads to longer lists of links. The navigation is relatively easy, but with the great number of links and sub-links,

Geological Website of the Month
continued on page 51

2013 – 2014 Houston Open Enrollment Course Schedule

Rose & Associates

Unconventional Resource Assessment and Valuation
June 2 – 5, 2014
October 27 – 30, 2014

Risk Analysis, Prospect Evaluation and Exploration Economics
January 27 – 31, 2014
April 21 – 25, 2014
September 22 – 26, 2014

Evaluating Tight Oil and Gas Reservoirs
May 5 – 8, 2014
January 27 – 31, 2014
April 21 – 25, 2014
September 15 – 18, 2014

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Candidate Search Underway

The nominations committee of the Houston Geological Society has begun its search for candidates in the two spring elections, one for delegates for the AAPG House of Delegates, of which a number of candidates are needed, and the other to elect a new HGS Board. To be considered for either of these you must be an active member of the HGS. Additionally, to run for the AAPG House of Delegates you must be a member of the AAPG.

If you are interested in running for an HGS office or for the AAPG House of Delegates, please contact Nominations Committee Chair **Martin M. Cassidy** at mcassidy.hgs@gmail.com or by phone at 713-503-8331. If you have any questions you may direct them to Martin. Information about the AAPG House of Delegates is also available from **Martha Lou Broussard** or **Bonnie Milne,** immediate past chair of the House of Delegates. Join the leadership, help guide the ship!

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Geological Website of the Month continued from page 49

one can get disoriented in the lower levels and need to pop back up to the homepage to get re-oriented.

Of course, because of the non-profit nature of the institution, much of the AMNH website is designed for revenue generation such as ticket sales, subscriptions, and requests for donations.

While most of the website content is designed for a general audience, if you drill down far enough there are some abstracts of high-level geological research such as "High-Pressure Crystal Chemistry of Potassium in Clinopyroxene and Other Phases" or "The Origin of Platinum Group Element Deposits in Layered Mafic Intrusions."

The best browsing on the website is found under the Explore tab. Here are detailed descriptions of the current temporary exhibits and most of the permanent exhibits. A tour through AMNH.tv is well worth a look. Here are more than 200 short videos on a broad range of natural history topics. There are more than 30 videos on paleontology. The videos range in length from less than one minute to nearly two hours. They include presentations and discussions by world-class researchers and behind the scenes looks at some of the unseen areas of the museum. Check out the "big bone room" where the largest dinosaur fossil bones are stored. Less than 0.02 percent of the dinosaur fossil bones at the AMNH is on display.

According to the website, the American Museum of Natural History is one of the world's preeminent scientific and cultural institutions. Since its founding in 1869, the Museum has advanced its global mission to discover, interpret, and disseminate information about human cultures, the natural world, and the universe through a wide-ranging program of scientific research, education, and exhibition. The Museum is renowned for its exhibitions and scientific collections, which serve as a field guide to the entire planet and present a panorama of the world's cultures.

In 2006, the Museum established the Richard Gilder Graduate School which includes a Ph.D. granting program in comparative biology within the Museum. Accordingly, the Museum's Charter was amended by the Board of Regents of the State of New York as follows: "to confer the degrees of Doctor of Philosophy (Ph.D.), and Master of Philosophy (M. Phil.) to duly qualified graduates completing registered curricula at the Graduate School of the American Museum of Natural History, and to award from the Graduate School the Honorary Degrees of Science (D.Sc.), Doctor of Laws (LL.D.), Doctor of Humane Letters (L.H.D.) and Master of Humane Letters (L.H.M.) to those selected by the Board of Trustees."

The history of the AMNH is woven into the fabric of the study of geology. In 1869, Albert Smith Bickmore, one-time student of Harvard zoologist and geologist Louis Agassiz, was successful in his proposal to create a natural history museum in New York City winning the support of prominent philanthropists. A series of exhibits went on view for the first time in 1871 in the Central Park Arsenal, the Museum's original home on the eastern side of Central Park. The Museum quickly outgrew the Arsenal and secured Manhattan Square, a block of land across the street from Central Park, between West 77th and 81st Streets, to build a bigger facility. The cornerstone for the Museum's first building at 77th Street was laid by United States President Ulysses S. Grant in 1874.

In 1881, the new Museum President Morris K. Jesup launched the Museum into a golden age of exploration that lasted from 1880 to 1930. During this time, the Museum was involved with expeditions that discovered the North Pole; explored unmapped areas of Siberia; traversed Outer Mongolia and the great Gobi; and penetrated the densest jungles of the Congo, taking Museum representatives to every continent on the globe.

The AMNH played a prominent role in the so call "bone wars" of the 1920s and 1930s when colorful paleontologists raced around the globe to beat competitors to the next exciting dinosaur fossil find. Under the auspices of the AMNH, Roy Chapman Andrews led the historic Central Asiatic Expeditions through the Gobi Desert of Mongolia, discovering some of the richest dinosaur fossil sites in the world. Andrews and his team worked there until the border between China and Outer Mongolia closed in 1930.

The website of the AMNH is a great adventure. So, the next time your geological field trip gets washed out, take a virtual field trip to fossil halls of the AMNH website and marvel at the history of life on Earth as represented in a fine institution. ■

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HGS General Dinner continued from page 27

Biographical Sketch

Harry T. "Bud" Holzman, Jr. has experienced some real adventure — and seen some really impressive geology along the way. A native Texan who grew up in California, he left college to join the U.S. Marines in 1966 and later transferred to the Army to become a helicopter pilot, serving in Vietnam where he flew Huey helicopters and gunships.

Mr. Holzman's decorations include the Legion of Merit, Distinguished Flying Cross, two Purple Hearts, Bronze Star, 40 Air Medals, Command Master Pilot's Wings, Combat Action Badge, Vietnamese Cross of Gallantry, and several others. He left active duty in 1971 and joined the Texas National Guard where he says he "got to fly helicopters for free."

After graduating from Trinity University in 1974, he went to work for Geomap as a geologist and stayed with that company for the next 26 years where he eventually became its president. He became a member of the American Association of Petroleum Geologists in 1976. He transferred from the Texas National Guard to the U.S. Army Reserves in 1976 to serve as a medical evacuation helicopter pilot in Houston.

In 2000, Mr. Holzman was called to active duty, received special training and was deployed to Iraq in 2004. He also was assigned as the "Chief Analyst - Iraq Oil and Gas Infrastructure." In that capacity, he authored numerous – mostly classified – papers on Iraq's petroleum reserves and the exploration potential of the country. He also has worked with the Iraq Oil Ministry and other Iraqi government agencies to rebuild their infrastructure and was involved in giving advice on several oil and gas articles in their constitution.

He retired in 2008 from the Army after 41 years and works as a geological consultant in San Antonio, Texas.

Mr. Holzman wishes to thank Dr. Roy, Dr. Freed, and Dr. Coppenger of Trinity University for preparing him for this task.

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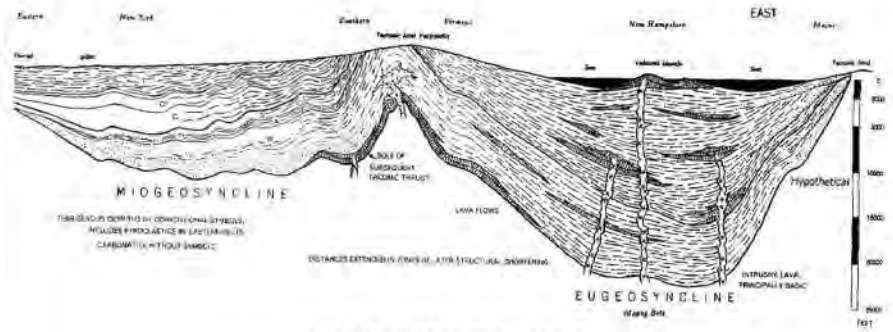

Look how far we've come!

(Kay, Marshall [1951], *North American Geosyncline*: Geological Society of America Memoir 48)

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33rd Annual GCSSEPM Foundation
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OMNI Hotel

More Information and Registration:
www.gcssepm.org

Government Update

*by **Henry M. Wise, P.G.** and **Arlin Howles, P.G.***

If you'd like the most up-to-date Texas rules, regulations, and governmental meeting information, we direct you to the HGS website to review The Wise Report. *This report, which comes out as needed but not more often than once a week, offers the most up-to-date information that may be of interest to Texas geologists.*

AGI Geoscience Policy Monthly Review (August 2013)

Science Committee Chairman subpoenas EPA air data

Congressman Lamar Smith (R-TX), Chairman for the House Committee on Science, Space and Technology, subpoenaed records from the U.S. Environmental Protection Agency (EPA) early this August. Rep. Smith hopes the records will show how the agency decided to instate newer and stricter air quality regulations in the United States. By subpoenaing the records, the committee wishes to independently verify the EPA's decisions regarding the controversial regulations. The agency complied on August 19th, providing the committee with decades-old raw data on the health effects of air pollution. The subpoena, which can be viewed at http://science.house.gov/sites/republicans.science.house.gov/files/documents/Subpoena%20link.pdf, was filed after House Republicans were unsatisfied by the EPA's response to previous requests to disclose records. Referred to by the Chairman as "secret" science, the records include data sets, test results, and health records, which EPA considers to be sensitive documents. Rep. Smith made assurances that the committee would remove any personal identifiers before making the information public.

New USGS Report Shows Public Supply Well Vulnerabilities

The U.S. Geological Survey released the results of a study designed to identify factors that affect the vulnerability of public water supply wells to contamination. More than one-third of the U.S. population gets its drinking water from these wells, and the study was done in response to evidence indicating low concentrations of contaminants in groundwater in many parts of the nation.

The report looks at water wells in ten regions across the U.S., four of which are highlighted in a video overview of the results. The study found that the source of a well's recharge water, the geochemical conditions encountered by groundwater traveling to a well, and the age of the groundwater accessed by a well are important indicators of a well's potential for contamination. The study also noted that water in some regions has preferential flow pathways – such as sinkholes in karst systems – which enable it to move quickly from the land surface to a well, decreasing the time available for contaminants to be degraded.

The study was done as part of the USGS National Water-Quality Assessment Program, which provides nationwide information on water quality conditions, how those conditions change over time, and how they are affected by natural processes and human activities.

The full report can be accessed on the USGS website (http://pubs.usgs.gov/circ/1385/).

New Study Suggests Warming Patterns Could Cause Sea Level to Rise 30 Feet

A new study (http://www.nature.com/ngeo/journal/vaop/ncurrent/full/ngeo1890.html) predicts that human-induced climate change may mimic similar conditions not seen for more than 115 thousand years. Published in *Nature Geoscience*, the new study has found that during the Eemian, a period of warming that preceded the last ice age approximately 127-116 thousand years ago, high temperatures caused sea levels to rise almost 30 feet. Although the exact timing is unclear, climate models now predict that we are on track to experience similar increases if we maintain current warming rates. If correct, this could have serious implications for coastal communities attempting to prepare for and mitigate against the effects of coastal erosion, storm surge, and flooding.

You can view the current Federal Emergency Management Administration's coastal flooding maps at (https://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1).

1987 Montreal Protocol Helped Soften Climate Change, Study Says

The Montreal Protocol on Substances that Deplete the Ozone Layer was established in 1987 to reduce the production and use of certain compounds that erode sections of the Earth's stratosphere, making us more vulnerable to radiation. Now, a new study published in the Journal of Climate concludes that the Montreal Protocol did more than just protect us from radiation; it also helped lessen the effects of climate change. The new research put out by scientists at New York University and Columbia University shows that the reduction in chlorofluorocarbons (CFCs) mandated by the Montreal Protocol also protected the planet from any major disruptions in global rainfall patterns, thereby reducing the effects of global warming and climate change.

Government Update *continued on page 54*

Government Update continued from page 53

USGS Awards State Geologists Grant to Help Preserve Data

This August, the U.S. Geological Survey (USGS) announced that it will award $606,073 to 25 state geologists and geological surveys across the country for the preservation of national geological and geophysical data. The Geological and Geophysical Data Preservation Program (NGGDPP), a national initiative at the USGS to create standards, procedures, and protocols for data collection, was established in 2005 as a part of the Energy Policy Act (Public Law 109-58, Sec. 351). The NGGDPP aims to provide a national catalogue of archived materials, provide technical and financial support to State geological surveys and relevant bureaus within the Department of the Interior, and to compile a comprehensive archive of all geological and geophysical data, including maps, well logs, and samples. The award also includes funding for more than 10,000 student hours to help train the next generation of geoscientists to preserve important records and specimens.

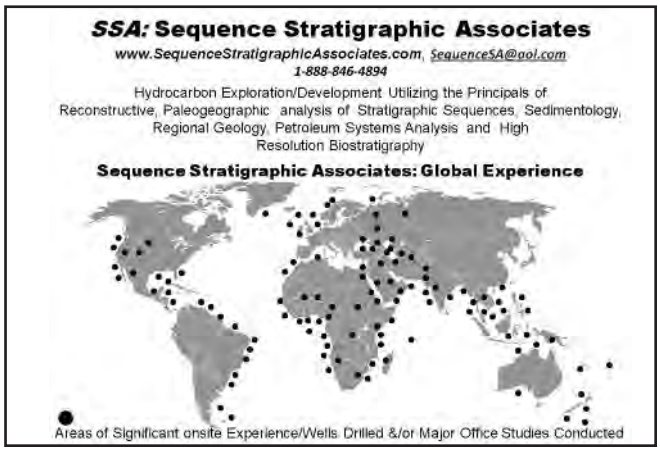
Floodplain Mapping Should Include Climate Variation, Group Says

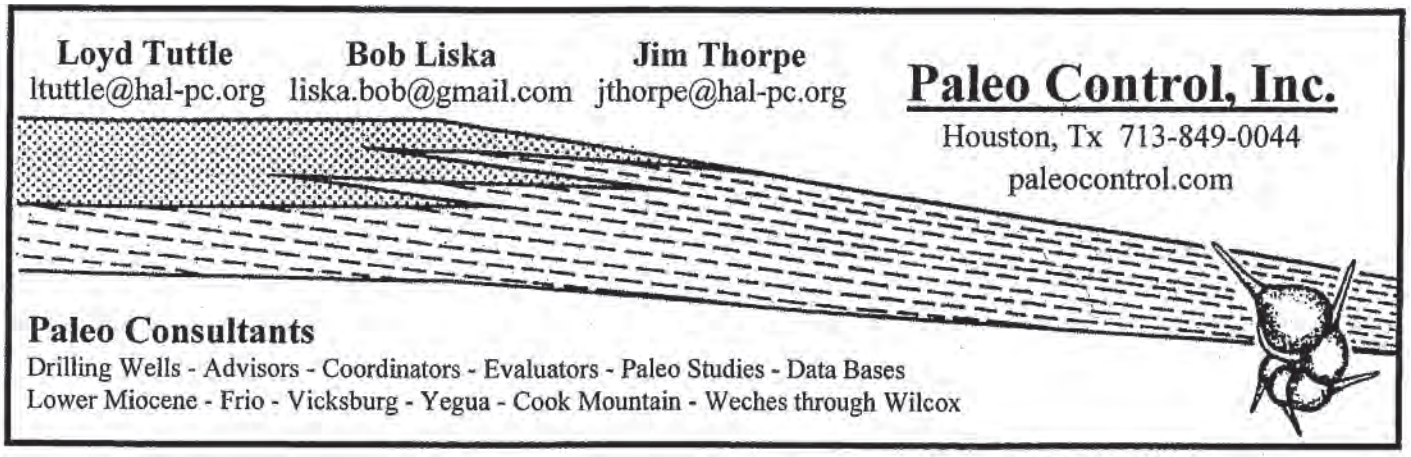
The Union of Concerned Scientists (UCS) released a report on August 13, 2013 that criticizes the failure of the National Flood Insurance Program (NFIP) to take account of climate change in risk assessment. The report is part of a larger effort by UCS to convince the Federal Emergency Management Agency (FEMA) to account for climate impacts on flooding in its policies. The report comes before the planned initiation of increased premiums for risky buildings, which will be done by the NFIP on October 1, 2013. It is among a number of changes that are contained in the Biggert-Waters Flood Insurance Reform Act of 2012 signed into law on July 1, 2013 by President Obama.

The legislation requires FEMA to establish a "technical mapping advisory council" to overhaul floodplain maps, but it is unclear whether this panel will advise the use of climate projection models in their assessment of future risks. The UCS report underlined the fact that FEMA flood maps are used by local land planners, engineering firms, and developers around the country for decisions such as site selection and building strength. The report urges FEMA to incorporate "scientific projections of sea level rise and its impacts, including coastal erosion and magnification of flooding risks from higher high tides and storm surges" in order to "set insurance rates and guide building codes and floodplain development decisions."

Report by the National Academies Identifies Potential of Induced Seismicity in Energy Technologies

This August the National Research Council (NRC) released a report, sponsored by the Department of Energy, which examines the relationship between induced seismicity and energy technologies. The report concludes that "hydraulic fracturing has a low risk for inducing earthquakes that can be felt by people, but underground injection of wastewater produced by hydraulic fracturing and other energy technologies has a higher risk of causing such earthquakes … In addition, carbon capture and storage may have the potential for inducing seismic events." The report also concludes that "technologies designed to maintain a balance between the amounts of fluid being injected and withdrawn, such as most geothermal and conventional oil and gas development, appear to produce fewer induces seismic events than technologies that do not maintain fluid balance."





The full report can be found at www.nap.edu/catalog.php?record_id=13355.

Melting Arctic Reveals New Resources And Political Struggles

New trade routes and untapped mineral deposits are just a couple things being revealed by the ever-thinning ice in an increasingly warm Arctic. This year alone nearly 400 ships passed through Russia's exposed Northern Sea Route, an Arctic waterway along the country's northern coast, and that number is expected to grow substantially in the coming years.

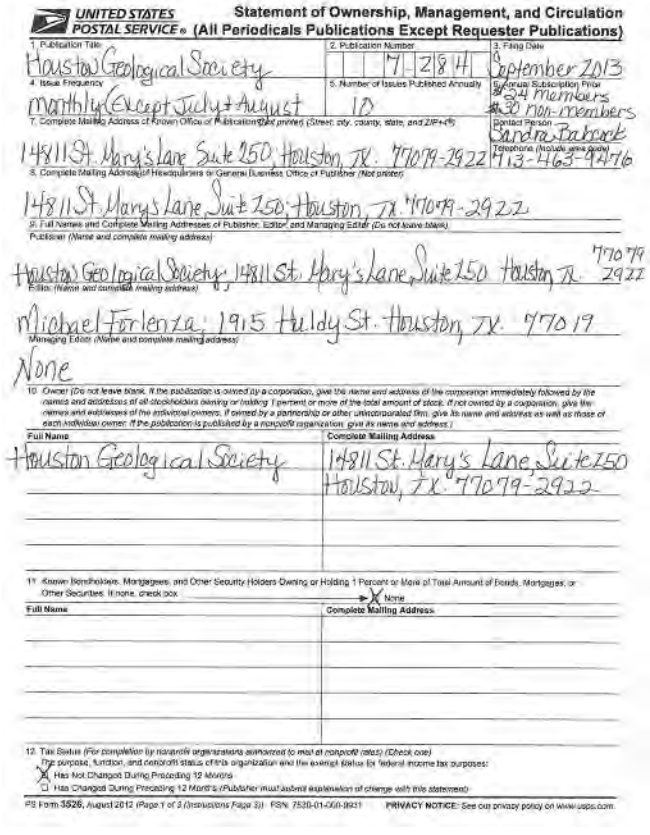
Eight countries — Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the United States — currently have a stake in the Arctic. Those eight nations have created an Arctic Council to coordinate policies surrounding the new territory. However, political tensions are beginning to rise over concerns of passage rights through the newly opening icy waters, and the fact that the United States has yet to ratify the U.N. Convention on the Law of the Sea is complicating some negotiations.

Unique "Fingerprints" Could Help Carbon Capture Efforts

A new methodology could lead to improved monitoring of geologic carbon sequestration. Although not yet commercially viable, underground sequestration of carbon dioxide is being explored as a way to reduce greenhouse gas emissions from fossil fuels that contribute to global warming.

At present, if several companies decided to sequester CO_2 in the same location, it would be difficult to determine which company's CO_2 were escaping if a leak occurred. Effective monitoring is needed, since large releases of CO_2 could invalidate tax breaks that companies might receive for carbon sequestration and could potentially pose human health risks.

The research group Scottish Carbon Capture and Storage (SCCS) is working on a way to determine whose carbon is whose by using unique chemical "fingerprints." Other researchers have been able to assign carbon emissions to particular emitters by labeling those emissions with noble gases like krypton and xenon, which are nonreactive and thus are conserved in the emissions. However, adding noble gases would increase the cost of a sequestration project. Instead, SCCS plans to determine the composition of noble gases already present in the emissions, which is expected to vary based on the fuel burned. The group intends to test this theory at what it hopes will be the world's first commercial scale carbon capture and storage facility, which it plans to open in 2014 at a coal plant owned by SaskPower in Saskatchewan, Canada. ■



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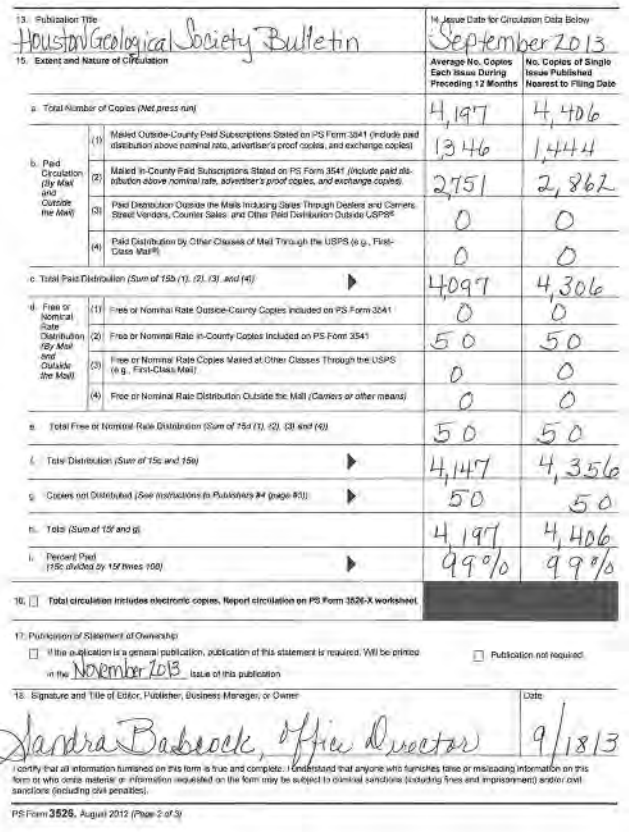

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b. Paid Circulation (By Mail and Outside the Mail)	(1)	Mailed Outside-County Paid Subscriptions Stated on PS Form 3541 (Include paid distribution above nominal rate, advertiser's proof copies, and exchange copies)	1346	1444
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f. Total Distribution (Sum of 15c and 15e)			4,147	4,356
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PS Form 3526, August 2012 (Page 2 of 3)

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All materials are due by the 15th of the month, 6 weeks before issue publication. Abstracts should be 500 words or less; extended abstracts up to 1000 words; articles can be any length but brevity is preferred as we have a physical page limit within our current publishing contract. All submissions are subject to editorial review and revision.

Text should be submitted by email as an attached text or Word file or on a clearly labeled CD in Word format with a hardcopy printout to the Editor.

Figures, maps, diagrams, etc., should be digital files using Adobe Illustrator, Canvas or CorelDraw. Files should be saved and submitted in .ai (Adobe Illustrator) format. Send them as separate attachments via email or CD if they are larger than 1 MEG each, accompanied by figure captions that include the file name of the desired image. DO NOT EMBED them into your text document; they must be sent as separate files from the text. DO NOT USE POWERPOINT, CLIP ART or Internet images (72-DPI resolution) as these do not have adequate resolution for the printed page and cannot be accepted. All digital files must have 300-DPI resolution or greater at the approximate size the figure will be printed.

Photographs may be digital or hard copy. Hard copies must be printed on glossy paper with the author's name, photo or figure number and caption on the back. Digital files must be submitted in .tif, .jpg or .eps format with 300-DPI or greater resolution at the printing size and be accompanied by figure captions that are linked by the file name of the image. The images should be submitted as individual email attachments (if less than 1 MB) or on CD or DVD.

Advertising

The *Bulletin* is printed digitally using QuarkXPress. We no longer use negatives or camera-ready advertising material. Call the HGS office for availability of ad space and for digital guidelines and necessary forms or email nina@hgs.org. Advertising is accepted on a space-available basis. **Deadline for submitting material is 6 weeks prior to the first of the month in which the ad appears.**

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7	$665	$1,123	$2,014	$3,834	$4,600					
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For more information regarding website advertising visit HGS.org or email nina@hgs.org.

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Qualifications for Active Membership

1) Have a degree in geology or an allied geoscience from an accredited college or university; or
2) Have a degree in science or engineering from an accredited college or university and have been engaged in the professional study or practice of earth science for at least five (5) years.

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Name: _____

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Degree _____ *Major* _____ *Year* _____

Earth Science Work Experience _____

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Applicant's Signature _____ *Date* _____

Endorsement by HGS member (not required if active AAPG member)

Name: _____

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revised 8/6/10

Houston Petroleum Auxiliary Council News

Edie Bishop, *HGS Liaison* 713-467-8706 or ewbishop@bishorb.com

Halloween is now past, much to the dismay of my husband! It is his favorite holiday, no pressure of gift selections just the purchase and sampling of tooth decaying candy for our neighborhood ghost and goblin trick-or-treaters.

It was also a memorable day for our HPAC members. **Martha Lou Broussard** and **Linnie Edwards**' HPAC Exploring Houston fall tour was a huge success. The group enjoyed visiting the Co-Cathedral of the Sacred Heart, a Tuscany lunch, and the public art of Rice University. This group meets three times a year starting with a couple of discovery trips around Houston and one road trip in the spring to explore our unique Texas history. Discovery trips have included a cruise on the Spirit of the Bayou, a tour of the historic Glenwood Cemetery, visiting the San Jacinto monument, and the Clayton Library. Road trips have been taken to the town of Columbus which was established in 1823, the civil war site in Port Arthur, and the Presidio La Bahia in Goliad. If you haven't been part of any of these tours, you have missed a wonderful experience. Watch your HGS *Bulletin* for information on the next adventure.

Mark your calendar for the November 4th Book Club meeting in the home of **Joanne Lane**. **Georgeann Massell** will lead the discussion of the newly published book, *The Aviator's Wife* by Melanie Benjamin. Drawing on the rich history of the twentieth century, the book reveals that Anne Morrow Lindbergh was much more than just an aviator's wife. In addition to becoming the first licensed female glider pilot, she was author of more than a dozen books. One of those books was *Gifts from the Sea* which has been a gift from many moms to their daughters to guide them through their challenging teen years. Chairs **Phyllis Carter** and **Anita Weiner** are responsible for the tremendous response the club has received. We are grateful to these two talented members.

Save the date for our next luncheon which will include a musical holiday program at the Lakeside Country Club on Tuesday,

Linnie Edwards and Donna Parrish at the Fall Board Meeting.

December 10th. Chair **Sheri McQuinn** and First Vice President **Sally Blackhall** along with committee members **Nancy Lefler, Janet Steinmetz, Kathi Hilerman, Beverly Smolenski**, and **Helen Thomas** are planning an outstanding event. Further details will be in next month's HGS *Bulletin.*

Remember that in addition to our regular luncheon programs and this special interest group, we have other interest groups: **Bridge: Audrey Tompkins** 713-868-0005 or **Daisy Wood** 832-581-3231, and **Book Club: Phyllis Carter** 281-397-9888 or **Anita Weiner** 713-572-9874.

Geologists, please encourage your spouses to join HPAC, where they will have an opportunity to meet other spouses of geologists, geophysicists, engineers, and landmen. They will participate in informative and entertaining programs, delicious lunches and welcoming fellowship. The HPAC membership form is included in the HGS *Bulletin*. Contact **Edie Bishop** at 713-467-8707 or ewbishop@bishorb.com for more information. ■

Ann Baillio, Alice Backsen, Judy Richey, SaraNan Grubb and Margret Ann Bromberg enjoying a recent HPAC luncheon.

You are invited to become a member of

HPAC

2013–2014 dues are $20.00 Mail dues payment along with the completed information

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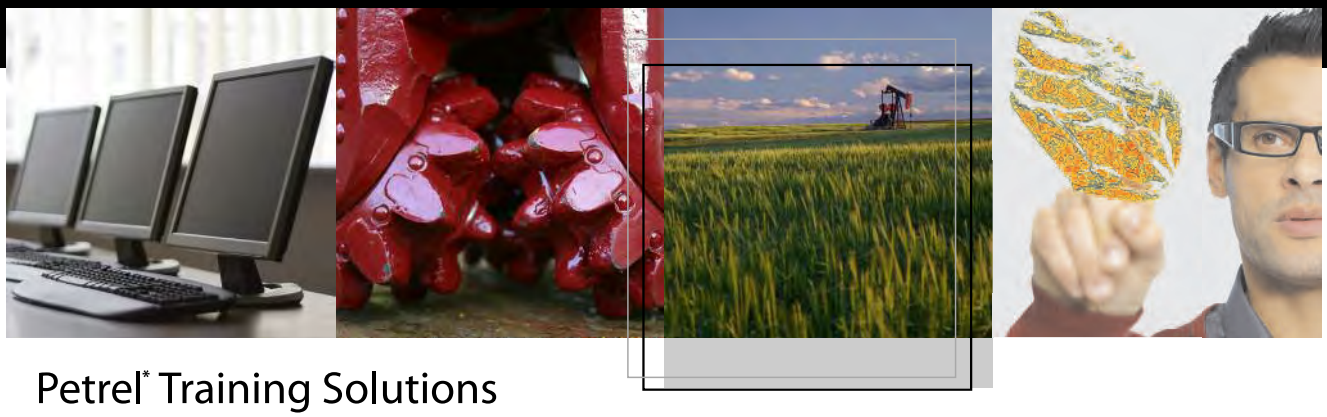

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