

HGSBULLETIN Houston Geological Society

Volume 55 Number 6

Houston Geological Society



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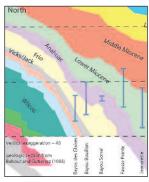
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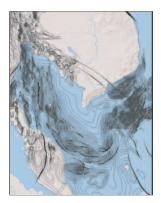
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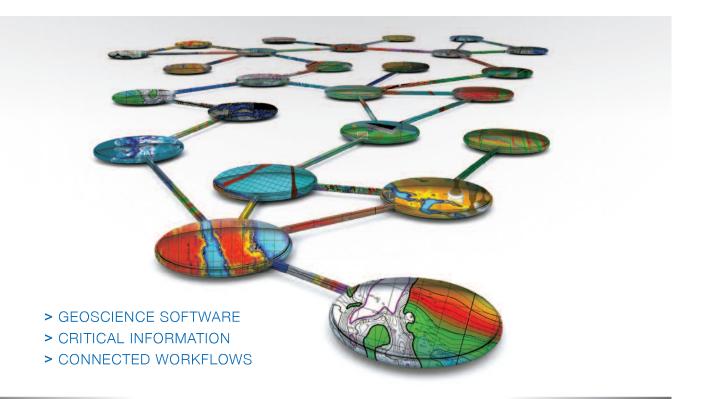


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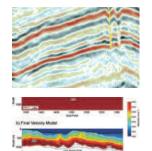


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About the Cover: Canyon de Chelly National Monument, Arizona. The massive high cliffs that form the walls of the canyon are the Permian De Chelly Sandstone. Spider Rock in the center of the view is a pinnacle carved out of the De Chelly Sandstone. *Photo courtesy of Claudio Bartolini*.



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Midwinter Greetings New Openness in the Industry

Not only is formal training

needed, but a whole new

set of information needs to

be absorbed. Cooperation is

more important than ever.

A Tinter is upon us and the cold wind may blow, but in the industry the warm breezes of openness and communication are felt among us. Companies that were unwilling to share data now volunteer to give talks at meetings and encourage their employees to attend by paying for their meals when expense accounts are submitted. Some companies are open to trading well data where previously participation in funding the well was required.

The willingness to make presentations at meetings is illustrated in the upcoming HGS Applied Geoscience Conference "Applied Geosciences for Mudrocks System" to be held Monday

February 18 and Tuesday February 19, 2013 at the Westin Memorial City hotel. We have recruited an outstanding roster of presenters. Among them are Shell, Noble, Bill Barrett Corp., Laredo Petroleum, Hess, ExxonMobil, and ConocoPhillips, whose experts are to give presentations. University researchers from California State University, Arkansas Geological Survey, Kansas Geological Survey, University of Rennes, France, University of Manchester

UK, and the Texas Bureau of Economic Geology will also present.

Service companies whose work is to be presented include Global Geophysical Houston, Corelab, Schlumberger, and Southwest Research Institute. This mix of presenters will provide new data to understand shale basins around the world.

HGS is not the only organization that offers meetings and training. Where a need exists, companies and organizations will move to take advantage of it. Advertisements for courses rain down each week. The AAPG, SPE, Hart and other organizations have scheduled courses here in Houston, the heart of the domestic, and much international, oil and gas business.

Why is this? During the downturn many oil and gas companies gave up or consolidated in-house training. Research laboratories were closed. Employee numbers were reduced.

Now, with the rush into resource plays, additional employees are being hired, especially those with training in fine-grained clastic sediments. The whole industry has awakened to a new day. Data flood in from numerous wells drilled in lightly-explored plays. Well completions and engineering methods have changed, and the best methods have yet to be settled upon.

Not only is formal training needed, but a whole new set of information needs to be absorbed. Cooperation is more important than ever. Competition still exists but is muted by huge acreage positions. The early idea of simply drilling up great pods of hydrocarbon saturated sediments has become more complex

> as we learn of sweet spots, dry gas trends, and the details that lead to economic resource plays.

> Companies cannot develop all the expertise they need in the time available. The time has arrived to listen to other explorers and attitude of sharing and cooperation born of

completion experts. Thus the new open necessity.

All of us can benefit from the changes in our business. We, and our companies, need the information found from others in technical meetings. HGS arranges useful meetings. There are great one and two day seminars, noon and evening meetings. We have a variety of emphases through our interest groups, are less expensive, and we are local so hotel stays and air travel are not required. Companies want you to get out and acquire new insights so participation is to your benefit. The greater breadth of training you possess, the greater your value to your employer.

So in spite of the cold weather, drive on through the wind, drive on through the dark, to the golden light of your evening meeting — with other members of the HGS.* ■

*(With apologies to Rodgers and Hammerstein.)

Looking for the next big opportunity?



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Patricia Santogrossi psanto@statoil.com

Tools of the Trade

We simply have to take care

that we do not lose the

ability to write and to compile

a compelling, unbiased,

justification presentation

for a well.

Some of my first industry experience with drilled wells came as result of the Continental Offshore Stratigraphic Test (COST) program begun in 1974. Utilized as an expense-sharing method of drilling test wells to obtain scientific data on the rock strata beneath the frontier offshore areas of the United States, I got to work one, the St George Basin No. 2 well, in the Bering Sea of Alaska, one offshore California and two in the Baltimore Canyon area of four such wells drilled in two years off the Atlantic coast. All COST tests were intentionally drilled off structure ie., away from a potential

trap for hydrocarbons so that there would be a minimal chance of an encounter with an accumulation of oil and gas while information on the regional stratigraphy, reservoir beds, and hydrocarbon potential was obtained.

Early Well Data Compilations

Copious amounts of data were acquired on these wells. In the early days, the only way to synthesize these data was by drafting it all onto a large format. These were aptly named "bedsheets" as they were very nearly

the size of a twin bed sheet by the time they were compiled. St. George COST No. 2 (1982) was the first one I worked; by the time the COST test offshore California was worked, geochemistry had become a bigger part of the story, and the compilation and well ties to seismic helped us to recognize that basement was deeper than previously interpreted, that Franciscan-derived debris had been mistaken for Franciscan basement, and there was the previously unappreciated potential for hydrocarbon maturation.

Between the time I worked the Pacific and Frontier regions and the COST tests on the Atlantic shelf, I spent some time at work onshore in the Williston Basin. There, I dreamed of annotated well logs. Rather, each new copy of a field or final well log at that time came off a mimeo type machine. So the logs were printed on "slimy" paper, any earlier work had to be copied onto it, and it was a continuous roll which was best suited for hanging cross sections. Pre-folded paper was a thing of the future.

Annotated logs are a whole separate discussion. At one company in the early 90's, we had a lovely on-floor file room for well results, but each data type was filed separately in folders or notebooks: paper copy log, petrophysics, geochemistry, biostratigraphy, etc. I instituted the preparation of hand-annotated log copies using standardized colors, symbols and annotations. These were then available to all and pre-folds could be copied. At the same time, I trained six people in the use of the well-to-seismic tie software DLPS (Digital Log Processing System?) affectionately referred to

as "doglips." The team eventually processed an average of up to 125 vertical wells with paleo each, 600 in all, across the Gulf of Mexico. These wells were tied to sixteen west-to-east, and four south-to-north seismic transects in an effort to accelerate the level of basin knowledge among the staff and to prepare for future lease sales. No copy or recollection of the format of these displays remains in my possession.

At my next company, a reentrant into the Deepwater GOM, now in the mid to late

90's, hardcopy logs were to be found only in a few individuals' offices; many others were found stored in a closet after one guy had left. These were collected and committed to a lateral filing cabinet system wherein all of the information for a given well was contained in a labeled expanding folder that could then be checked out. The help of administrative staff and my drive to see it done made this paradigm transformation possible in a relatively short time. This system accomplished several things: for the first time we knew what we had, the material could be accessed in a hurry for a prospect or opportunity evaluation, and in the event a second party needed the same material, they would know who had it to borrow or make copies.

The Digital Era Presaged

The Baltimore Canyon wells B-2 and B-3 were the first deep stratigraphic tests on the Mid-Atlantic outer continental shelf. The former was drilled by Ocean Production Company from December

From The Editor continued on page 9



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From the Editor continued from page 7

1975 to March of 1976, and the latter drilled by Chevron USA, Inc. from October 1978 to March 1979. The latter was also an early deepwater well as it was drilled in 2686 feet of water. These wells were drilled for a group of companies to help evaluate the petroleum systems of offshore areas before bids were submitted in lease sales. Reports on these wells ran to more than 100 pages and contained information on geology, lithology, bistratigraphy, geothermal gradients, organic geochemistry, geophysics, and petroleum potential.

By the time I worked these wells in the early 80's, interest in the play potential had cooled, but there was still much to learn about the size and situation of subtle elements of the basin fill such as nanno oozes, oolite shoals, and rudistid reefs, as well as to the rather dramatic Jurassic reef edge and its potential for deepwater clastic aprons. Moreover, this work synthesized a great deal of information that was in danger of being lost.

To summarize these wells, part digital-part drafted elements were assembled in an early composite log display, the first I had produced since the bedsheet days. More importantly, these displays

were meant to bridge the gap between geology and geophysics for the *dual purpose of well to seismic calibration in lateral prediction* and to advance basin knowledge.

An example is shown in **Figures 1a** and **1b** was compiled by me and rendered by a draftsman. The log suite, synthetic, and seismic traces are output from individual digital sources at the same **time** scale were first compiled in drafting. Biostratigraphic, sequence stratigraphic, lithologic, and paleobathymetric data were added later, sketched and then drafted to scale.

Digital Drilled Well Composites

Finally in 2005, I had the golden opportunity to design for my company a completely digital *composite log display*. Having carfted a similar display during a short consult using fabulous PC-based HDS software, I knew what I wanted to do when I collaborated in London with a Geolog consultant to interactively realize my concept along with key recommendations in a Linux-based display. As a living document, developments continued with use and a second, Houston-based, Geolog consultant in 2006. Ultimately, the

From The Editor continued on page 11

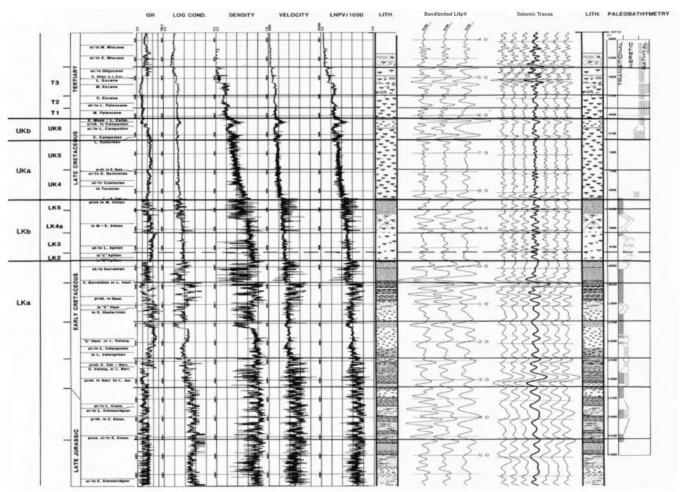
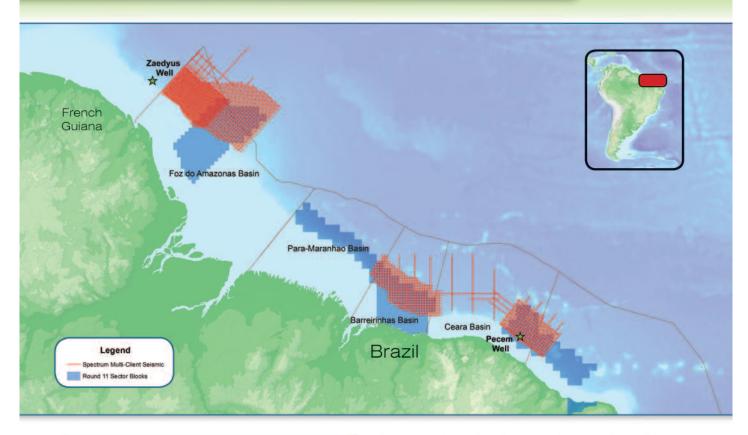
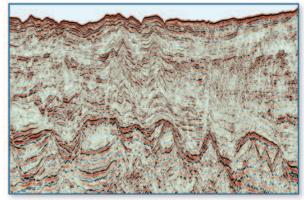


Figure 1a.

Equatorial Margins Brazil

Multi-Client Seismic - Amazonas, Ceara and Barreirinhas Basins





Canyon Features from Foz do Amazonas Survey (Phase I)

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

Spectrum has also commenced the next phase of its Foz do Amazonas program, which will acquire an additional 6.000 km over this basin.

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

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



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From the Editor continued from page 9_

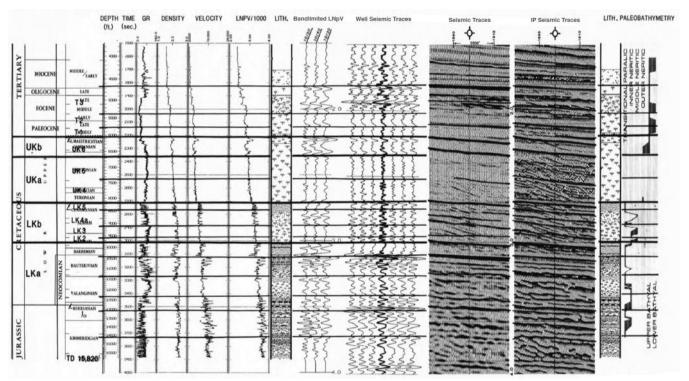


Figure 1b.

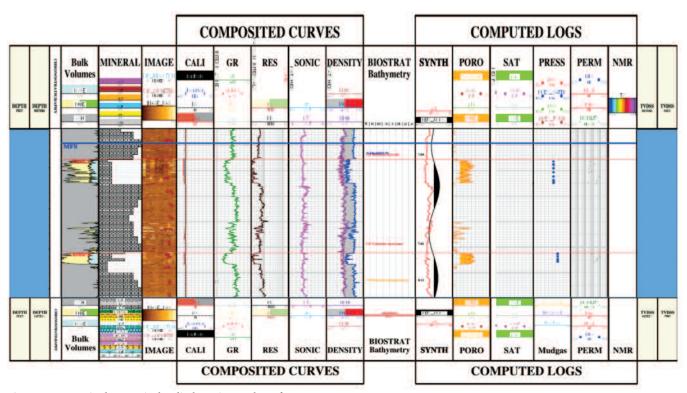
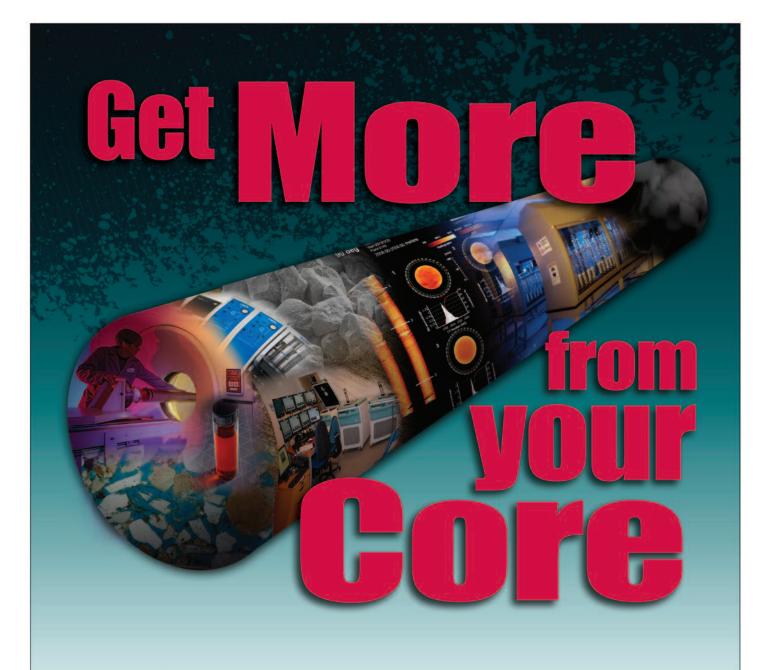


Figure 2: Customized composite log display using Geolog software.

From The Editor continued on page 13



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From the Editor continued from page 11

tool was turned over to our growing petrophysical community for routine utilization and safekeeping. The final element of my original design fell into place in October 2010.

Currently we co-display the following information (Figure 2):

Recorded: Measured depth (left scale), chronostratigraphy, relative bulk volumes of shales, reservoir sands, and fluids; mineral log, image logs, caliper, gamma ray log, resistivity log, sonic log, density log;

Interpreted: Biostratigraphy and bathymetry, sequence boundaries, lithologic tops and bases;

Computed: Acoustic impedance curve and well synthetic curve, sand flag based on porosity, saturation, formation pressure, pore pressure, permeability, nuclear magnetic resonance, TVDss depth (right scale).

I have seen plenty of other companies' petrophysicists use this software for their own purposes. The universal applicability of this tool was first successfully tested on a reservoir engineer! This display was not only designed to be a documentation of sands and shale properties, but to be a communication basis to give

all disciplines a common access to learnings and ready basin knowledge.

Proposed Well Composites

There is another kind of composite display that is important to consider. First brought to my attention in the late 80's while I worked Brazil it was called a "perfil composito" in Portuguese. These were used to document well proposals and prognoses. At the time we constructed them, then had them drafted, in an 8 ½ by 11" pre-folded page format, regardless of the elements such as seismic lines. The first page as I recall was an area map, followed by a justification for the well, type and/or prognosis log, key seismic lines, etc.

Today we have PowerPoint presentations to take the place of drafted copy and that is a good thing. Our proposals are now summarized occasionally on one page for management's convenience (**Figure 3**). We simply have to take care that we do not lose the ability to write and to compile a compelling, unbiased, justification presentation for a well.

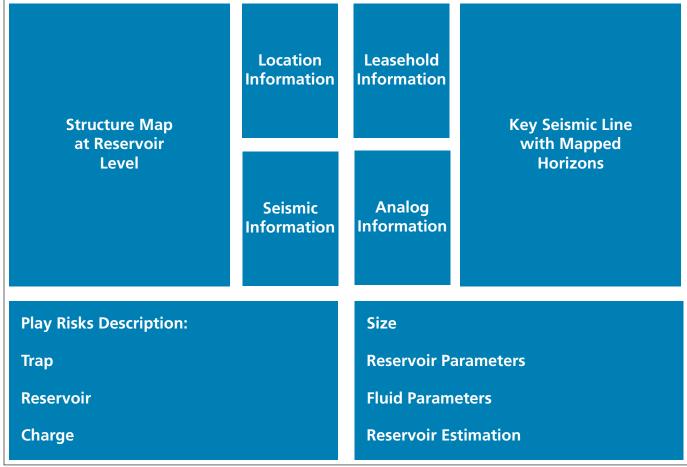


Figure 3: One page prospect summary.

Letters to the Editor

Hi Tricia,

Long time no see. Obviously you are doing well enough to put together a heckova journal in HGS.

You have a number of members here in New Orleans as well, some of us very familiar with Dr. Potter. I had him for strat-sed as an undergrad at Cincinnati, where he still is, sans email.

At SIPES yesterday we (guys like Klekamp and Picou) were discussing the incredible article you published in the December issue. None of us can get our arms around it, it is like a complete collegiate course in 17 pages. In simple terms, I can usually work my way through the *Bulletin* over a lunch hour, or, ummmmm, in a couple of trips to well, another spot if I'm not checking Twitter. Obviously, the answer lies in re-reading the article another couple of times. Interestingly, I don't recall

seeing the authors pay any attention to the incredible sand dumping and hydrocarbon accumulations in the GOM that occured as a result of the global changes the authors discussed.

But that is not why I bother you. How did you get hooked into Dr. Potter? I have not seen him since the Geology Centennial celebration at UC a couple of years ago, unless AAPG here came after that. He still gets around, quite a man.

Anyway, you sure have published something beyond thought-provoking, which I guess is the highest praise an editor can get.

Merry Christmas!

mike Michael N. Fein, Staff Geologist W&T Offshore, Inc. [As a fan of the HGS *Bulletin*, Paul Potter offered his article to us last March. Dr. Potter (potterpe@gmail.com) is still active at 86 years young. We plan to meet at AAPG Pittsburg for dinner. - Ed.]

.....

Hi Patricia,

Good points in your Jan HGS Bulletin article. It is difficult to find mature and really integrated groups to do a comprehensive geological interpretation. I liked.

Andre Picarelli, MSc, PhD
Development Production Department
Non Operated Assets Manager
Petrobras America Inc

February 2013





Integrated Approaches to Unconventional Reservoir Assessment & Optimization

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

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Emerging Plays

Day 2: Mudrocks System Characterization

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TECHNICAL PROGRAM

2013 Applied Geoscience Conference Westin Memorial City, Houston, Texas

MONDAY, FEBRUARY 18, 2013

7:00 am	Registration Opens	Fourth Floor, Willow Room
8:00 am - 8:00 pm	Core Display	Fourth Floor, Pecan Room
·	Selected Core from Emerging and Established	Unconventional Reservoirs
8:00 am - 5:00 pm	Technical Sessions	Fourth Floor, Azalea Room
11:35 am - 1:00 pm	Poster Sessions	Fourth Floor, Cedar Room
·	Invited Presentations from Industry Consor	tiums

OUTCRO	P TO SUBSURFACE CHARACTERIZATION SESSION
8:00 am	Opening Remarks
8:10am	Outcrop to Asset: Integrated Field, Core and Log Study; Eagle Ford Calum Macaulay, Shell, Houston, TX USA
8:45 am	Niobrara Exploration & Production: Integrated Reservoir Insights and Repeatable Results Benjamin C. Burke, Noble Energy Inc., Denver, CO USA
9:20 am	The Monterey Formation: A Natural Laboratory for Lithology, Diaganesis, Mechanical Stratigraphy and Facies Architecture Richard Behl, California State University, Long Beach, CA USA
9:55 am	Break
10:25 am	Fayetteville Shale Exploration in Arkansas: Stratigraphy, Petrology, and Geochemistry M. Ed Ratchford, Arkansas Geological Survey, Little Rock, AR USA
11:00am	Pennsylvanian Gothic & Hovenweep Shale Formation Exploration in the Paradox Basin: Stratigraphy and Petrology Pete Moreland, Bill Barrett Corporation, Denver, CO USA

EMERGIN	EMERGING PLAYS SESSION 2				
1:00 pm	Opening Remarks				
1:10 pm	The Cline Shale—Characterizing a New Resource Play in the Midland Basin Jeff Tanner, Laredo Petroleum, Midland, TX USA				
1:45 pm	Role of Basin Modeling in Point Pleasant Appraisal, Eastern Ohio Steven Crews, Hess Corporation, Houston, TX USA				
2:20 pm	Local Expression of Regional and Global Factors in Mudstone-Reservoir Occurrence, Character, and Distribution in Platform/Ramp Source-Rock Settings: Examples from Toarcian Posidoniaschiefer, Schistes Cartons, and Jet Rock, Northwest Europe Kevin Bohacs, ExxonMobil Upstream Research Company, Houston, TX USA				
2:55 pm	Break				
3:15 pm	Exploration to Field Development of the WolfBone Play, Southern Delaware Basin, an Oil-Rich Unconventional Resource Bill Fairhurst, Eagle Oil & Gas, Dallas, TX USA				
3:50 pm	Mississippian Exploration: Stratigraphy, Petrology, and Reservoir Properties Dr. Lyn Watney, Kansas Geological Survey, Wichita, KS USA				
4:25 pm	Sweetspots in Foreland Basins: Insights from the Neuquen Basin, Argentina, and from Physical Models Dr. Peter Cobbold, University of Rennes, France				

6:00 pm - 8:00 pm	Conference Social Hour	Fourth Floor
6:00 pm - 8:00 pm	Poster Sessions	Fourth Floor, Cedar Room
	Invited Presentations from Industry	

TUESDAY, FEBRUARY 19, 2013

7:00 am	Registration Opens	Fourth Floor, Willow Room
8:00 am - 4:00 pm	Core Display	Fourth Floor, Pecan Room
·	Selected Core from Emerging and Established	Unconventional Reservoirs
8:00 am - 5:00 pm	Technical Sessions	Fourth Floor, Azalea Room
11:35am - 1:00 pm	Poster Sessions	Fourth Floor, Cedar Room
·	Invited Presentations from Industry Consor	rtiums

MUDROCI	K SYSTEMS CHARACTERIZATION SESSION 3
8:00 am	Opening Remarks
8:10 am	Integrated Geophysical Analysis of Unconventional Resources Yaping Zhu, Exxon/Mobil Exploration Company, Houston, TX USA
8:45 am	Processes and Scales of Mineral Diagenesis in Mudstones: Impacts Upon Rock Properties and Porosity Kevin Taylor, University of Manchester, Manchester, UK
9:20 am	Is it the Rock or the Frac? Shale Reservoir Quality and Production Performance Randy Miller, Core Laboratories, Houston, TX USA
9:55 am	Break
10:25 am	Dual Mineral Matrix and Organic Pore Textures in Thermally Mature Niobrara Formation, Rocky Mountain Region, USA—Implication for Tight-Oil Carbonate Reservoir Modeling Chris Laughrey, Weatherford Laboratories, Houston, TX USA
11:00 am	Understanding Fundamentals of Multi-phase Flow in Liquid Rich Mudstones M. M. Honapour, Hess Corporation, Houston, TX USA

RESERV	OIR CHARACTERIZATION TOWARDS OPTIMIZED STIMULATION & PRODUCTION SESSION 4
1:00 pm	Opening Remarks
1:10 pm	Ross Peebles, Global Geophysical, Houston, TX USA
1:45 pm	Natural Fracture Occurrence in Domestic Unconventional Shale Plays-Frequency and Prediction Julia Gale, Bureau of Economic Geology, Austin, TX USA
2:20 pm	Integrating Outcrop Analogs and Geomechanical Modeling - Insights into Induced Hydraulic Fractures Alan P. Morris, Department of Earth, Material, and Planetary Sciences, SW Research Institute, San Antonio, TX USA
2:55 pm	Break
3:15 pm	Use and Abuse of Geomechanics in the Development of Unconventional Gas Plays Amie Hows, Shell Exploration and Production Houston, TX USA
3:50 pm	A Mechanical Stratigraphic Method for Integrating Geological Heterogeneity with Engineering Design David Amendt, ConocoPhillips, Houston, TX USA
4:25 pm	Evaluating the Impact of Mineralogy, Natural Fractures, In Situ Stresses on Hydraulically Induced Fracture System Geometry in Horizontal Shale Wells Cameron Miller, Schlumberger, Oklahoma City, OK USA
5:00 pm	Conference Summary and Closing Technical Chairs

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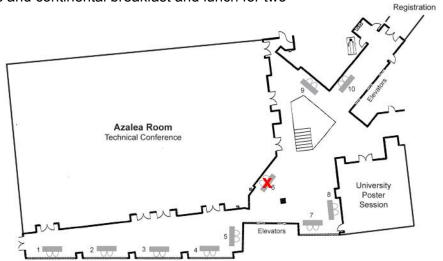
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HGS General
Dinner Meeting

Phil NelsonU.S. Geological Survey
Denver, Colorado

Overpressure and Hydrocarbon Accumulations in Tertiary Strata, Gulf Coast of Louisiana

Many oil and gas reservoirs in Tertiary strata of southern Louisiana are located close to the interface between a sandrich, normally pressured sequence and an underlying sand-poor, overpressured sequence. The transition from normally pressured to highly overpressured sediments is documented by conversion of mud weights to pressure, plotting of all pressure data from an

individual field as a function of depth (**Figure 1**), and identification of a top and base of the pressure transition zone. Vertical extents of pressure transition zones in 34 fields across southern onshore Louisiana range from 300 to 9,000 feet and are greatest in younger strata and in the larger fields. Display of pressure transition zones on geologic cross sections illustrates the relative independence of

the depth of the pressure transition zone and geologic age.

Comparison of the depth-distribution of pressure transition zones with production intervals confirms previous findings that production intervals generally overlap the pressure transition zone in depth, and that the median production depth lays above the base of the pressure transition zone in most fields. However, in 11 of 55 fields with deep drilling, substantial amounts of oil and gas have been produced from depths deeper than 2,000 feet below the base of the pressure transition zone (**Figure 2**).

Mud weight data in seven fields show that "local" pressure gradients range from 0.91 to 1.26 psi/ft below the base of the pressure transition zone. Pressure gradients are higher, and computed effective stress gradients are negative in younger strata in coastal areas. This finding indicates that a greater potential for fluid and sediment movement exists there than in older Tertiary strata.

HGS General Dinner continued on page 23

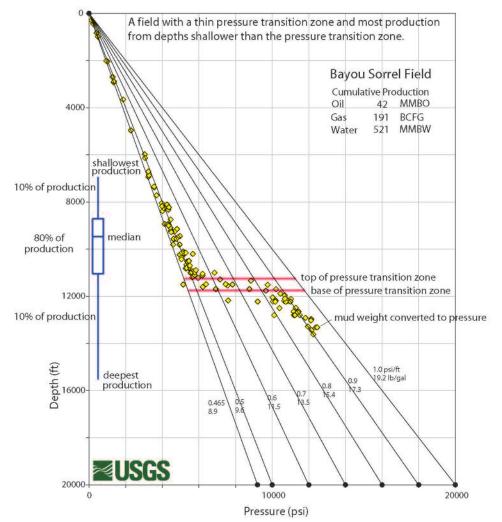


Figure 1: A field with a thin pressure transition zone whose top is at 11,500 feet depth, as revealed by mud weights. Most of the oil and gas produced from this field has been produced from depths above the pressure transition zone (blue rectangle). Other fields differ in the thickness of the pressure transition zone and the relative depth range of productive intervals.



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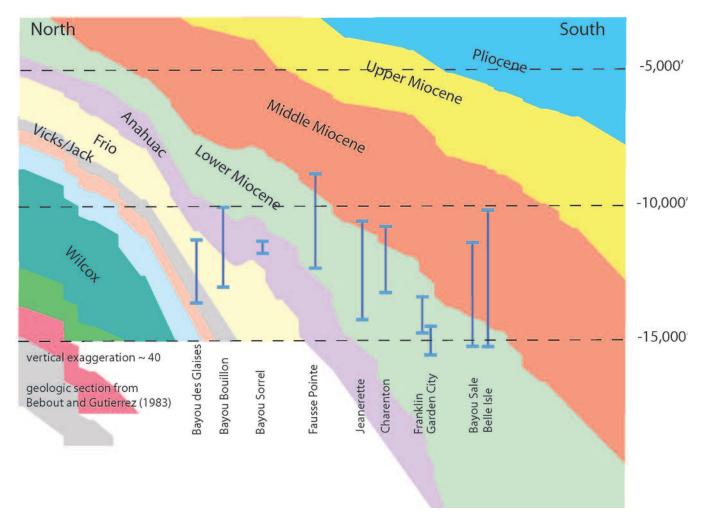


Figure 2: Pressure transition zones in 10 fields are shown on a north-south cross section in southern Louisiana. Vertical blue bars show top and base of pressure transition zone in each field. Note the gulfward progression of overpressure from older to younger strata, as originally pointed out by Dickinson (1953).

Biographical Sketch

PHIL NELSON is a member of the Central Energy Resources Science Center of the United States Geological Survey, which provides domestic and worldwide assessments of undiscovered oil and gas. Before joining the USGS, he held research positions in mineral exploration with Kennecott Exploration Services, radioactive waste storage with Lawrence Berkeley Laboratory, and oil and gas production with Sohio Petroleum Company. His career interests have been in exploration geophysics, downhole measurements, and the physical properties of rocks, with application to mineral exploration, disposal of nuclear waste, and oil and gas production and exploration. He has authored or co-authored more than 70 papers and is also co-author of a book on well logging. His current interests are in the characteristics of tight gas resources and the pressure regimes of sedimentary basins.

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Paul R. Dunphey
Dunphey Petroleum Services, Inc.

The Technical and Practical Aspects of Underground Storage Tank Installation and Repair

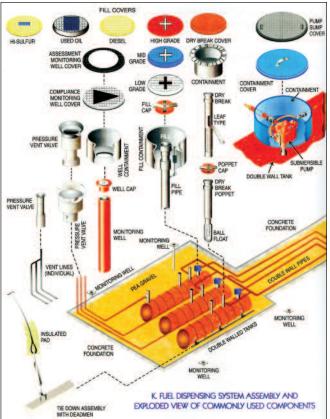
Tith over twenty years in the storage tank business, I have rare insight in the complex business of the installation of huge underground storage tanks that hold explosive and carcinogenic substances, namely gasoline and diesel fuels. The systems must be designed and installed with strict observance of federal and state regulations involving engineering and environmental practices. Since the 1990s, the complexity of these systems has rapidly expanded to include integrated dispenser systems, electronic fleet managment software, point of sale interfaces, additional fuel types such as ethanol and low sulfur fuel, air pollution management systems, overfill and spill capture systems, leak detection monitoring and reporting, corrosion protection, and a myriad of other manmade and nature-induced challenges. See how the TCEQ rules impact this business with a rare glimpse inside the industry from an expert in the typically unobservable world of underground storage.

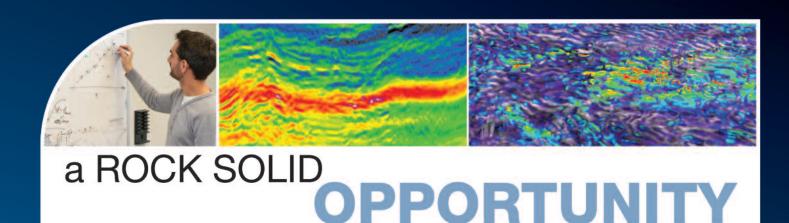
Biographical Sketch

PAUL attended Northrup University and studied Aerospace Engineering in Los Angeles, California in the mid 1980s. He worked

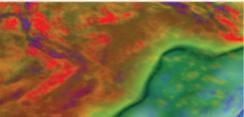


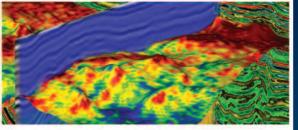
for Continental Airlines in the late 1980s in airplane production and then switched to the oil and gas business in the 1990s. From 1991 until 1997, Mr. Dunphey was involved in the building of fueling service stations and the manufacture of underground and above ground storage tanks. Founded in 1993, Paul owns and operates Dunphey Petroleum Services, Inc, one of the largest installation and repair businesses that deals with underground storage tanks in Harris County. He is involved with many civic and charitable organizations that include service as a City Council Member for the City of Seabrook, and as a Board Member for Boys & Girls Harbor and for the Galveston Bay Foundation.











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Dinner Meeting

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

Cost: \$28 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.

Robert C Shoup; Subsurface Consultants and Associates LLC Robert J Morley; Palynova Ltd Tony Swiecicki; Cerberus Consultants Ltd Stuart Clark; Mubadala Petroleum

Tectono-stratigraphic Framework and Tertiary Paleogeogeography of Southeast Asia; Gulf of Thailand to South Vietnam Shelf

Accurate basement maps

are key to understanding

the tectonic framework.

The structure and stratigraphy of many of the rift basins in the Gulf of Thailand and southern Vietnam shelf are individually

well understood. However, the understanding of the region as a whole, and the relationships from one basin to another, are less clear. Regional paleogeographic maps help portray the structural and stratigraphic evolution of the basins; and when constructed with precise chronostratigraphic control, these maps

provide a constraint to the interpretations of the facies distributions in individual basins.

Accurate basement maps are key to understanding the tectonic framework. A number of published and proprietary maps of the pre-Tertiary exist, but all are different, some substantially so. We used well data, seismic data, and published/proprietary maps to hand-contour basement structure across the region. A contour

interval of 200 meters was used to further constrain the maps. There are 22 Tertiary rift basins in the region (**Figure 1a**), although some of the basins are composite basins consisting of several coalesced rift basins.

We also used well data, seismic data, and published/proprietary maps to hand-contour the top of the synrift section across the region using a contour interval of 100 meters (Figure 1b). The age of the top synrift section varies across the map area from Middle Oligocene in the east to Early Miocene in the northwest.

HGS International Dinner continued on page 29

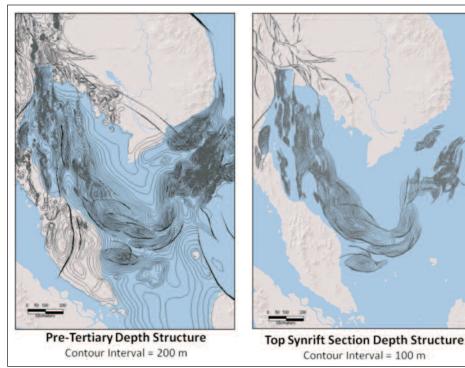
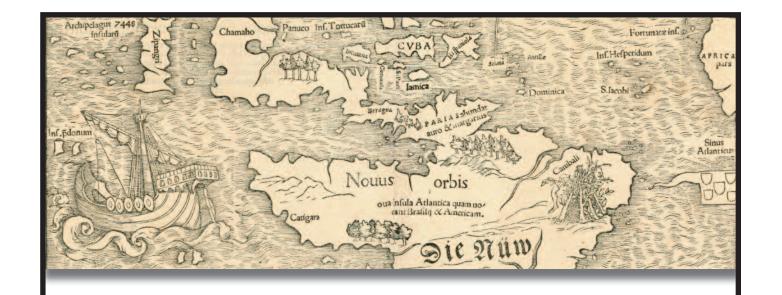


Figure 1a and b: Depth structure maps for the pre-Tertiary and the top of the synrift section.



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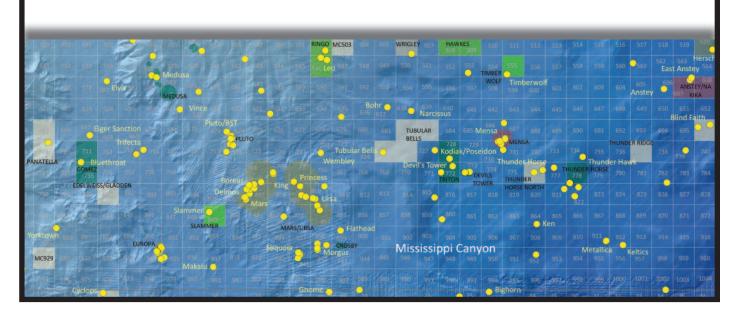
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ATTENDED STATES	North Malay Basin	Malay Basin	Penyu Basin	Natuna Basin	Nam Con Son Basin		
RESTOCK CALABRIAN GELASIAN		Grp A				CALABRIANCENE REST	VIM 90
5 6- CIÁ	FM 3	Grp B	Pilong	Muda	Bien Dong	PACENZAN CHINA E	VIM 80
CIR.	FM 2E	Grp D		U. Arang	NCS		VIM 70
8 8		Grp E (part)		***************************************		TORTONIAN 5 Z Z 10	VIM 60
SA Z Z Z SERVANIAN	FM 2D	Grp E (part)					
15 See See See See See See See See See Se	FM 2C	Grp F Grp H			Mang Cau	LANGHAN NO E	VIM 50
20 S S S S S S S S S S S S S S S S S S S	FM 2B FM 2A	Grp I	Pari	U. Arang	Thong	20	VIM 40 VIM 38
20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	FM 1	Grp J		L. Arang	Dua	AQUITANIAN	VIM 32
25		Grp K	Penyu	Barat/Udang		25	VIM 31
O 5		Grp L		200	Cau	CHATTIAN &	
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COS DO DE LE ROPELIAN		Grp N/O/P		Belut Benua	Tien Cau		
35 COS DE LA PERROMAN	Shoup 2009	?		Lama	Swiecicki et al 2011	PRIABONAL PRIABO	
Synrift	Tran	nsitional	Po	ost-rift [Inversion		Hiatus

Figure 2: *Stratigraphic framework and correlations.*

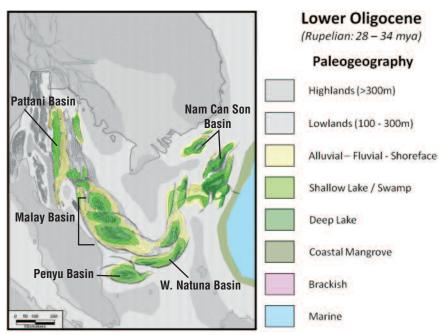
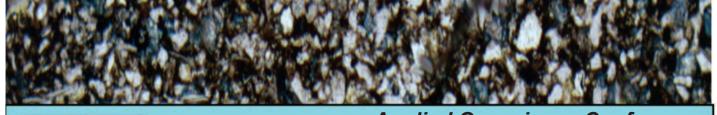


Figure 3: Lower Oligocene (Rupelian) paleogeographic map. Pink areas on Figure 2.

Paleogeographic maps for the Oligocene and Miocene that extend from the Gulf of Thailand to the Vietnam Shelf were constructed based on the succession of sequences of Morley, Swiecicki, and Dung (2011). The stratigraphic framework shown in Figure 2 is color-coded by the basin's tectonic activity at the time ie., rifting, transitional from rift to post-rift, post-rift, and inversion.

Deposition during the Early Oligocene Rupelian (~28 - 34 Ma) which includes the Tien Cau in the Nam Con Son Basin, Belut and Gabus in the West Natuna Basin, and Seismic Groups M and Formation 0 in South and North Malay basins, consists of extensive freshwater lakes and/or swamps with widespread alluvial, fluvial, and lacustrine shoreface systems developed along rift basin margins (Figure 3).

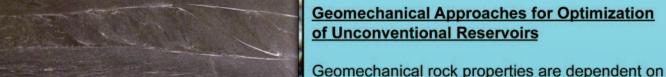
HGS International Dinner continued on page 31





Applied Geoscience Conference Interdisciplinary Micro to Macroscale Geomechanics November 6-7, 2013

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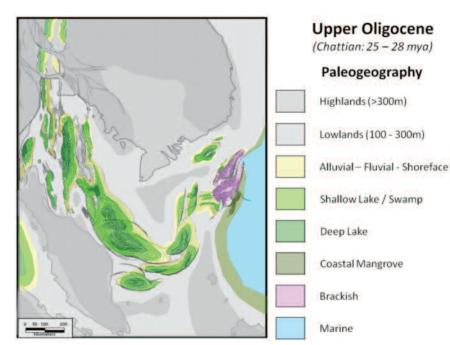


Figure 4: *Upper Oligocene (Chattian) paleogeographic map. Green areas on Figure 2.*

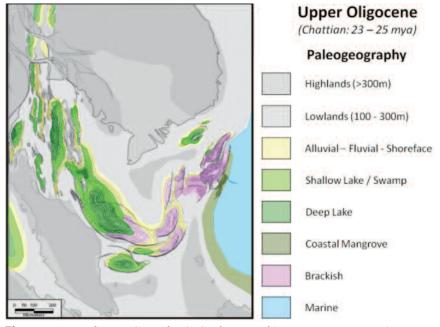


Figure 5: Upper Oligocene (Late Chattian) paleogeographic map. Green areas on Figure 2.

In Late Oligocene Chattian (~25 - 28 Ma), brackish incursion extended into the Nam Con Son (NCS) Basin of Southern Vietnam. This resulted in the deposition of extensive brackish water coals of the Cau Formation in that region. *Florshuetzia acmes* in the eastern NCS indicate a coastal mangrove environment. During the first half of the Chattian, fresh water lacustrine systems prevailed across the rest of the region (**Figure 4**).

Near the end of the Chattian, repeated *Miliammina fusca* occurrences in the Udang Formation indicate that brackish water transgressions had reached the Natuna Basin and the southern Malay Basin. The cyclicity observed in the Natuna Basin is not observed in the Malay Basin, although this has not yet been studied biostratigraphically in a manner which would allow the cyclicity to be seen and may be masked there due to deeper water conditions (**Figure 5**).

HGS International Dinner continued on page 33



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Coffee - \$1,000

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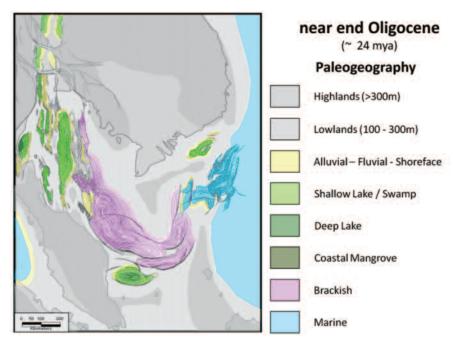


Figure 6: Near end Oligocene thermal maximum (~24 mya) paleogeographic map. Green areas on figure 2.

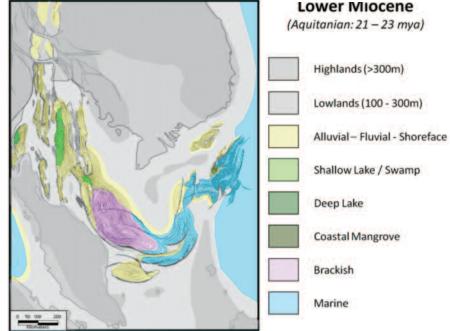
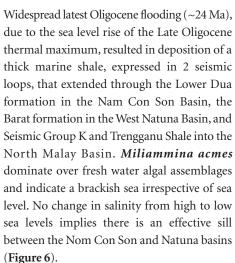


Figure 7: Early Miocene (Aquitanian) paleogeographic map. Predominately older yellow areas on figure 2.

Biographical Sketch

Bob Shoup is a Board Certified Petroleum Geologist with over 30 years' experience in basin analysis, regional studies, new play generation, prospect evaluation, field studies and development planning, drilling operations, and project management. Mr. Shoup began his career at Shell Oil in 1980. He worked for private oil companies for four years before becoming an independent consultant in 2003, working in Thailand, Malaysia, Vietnam, and New Zealand. He joined Subsurface Consultants & Associates's Training Department in 2012. He is a proven oil finder with a 46% exploration success rate and over 100 MMBOE of discovered resources; and is a recognized expert in clastic depositional environments, rift basins, and syndepositional structural systems.

Biographical Sketch continued on page 35



The Early Miocene Aquitanian (~21–23 mya) was characterized by slow intermittent transgression, with marine influence represented by the Dua, Arang, Seismic Groups J and I that extended to the southernmost Malay Basin at ~22 Ma. The Malay Basin remained brackish (**Figure 7**) until the Burdigalian (**Figure 8**).

HGS International Dinner continued on page 35





The 12th PESGB/HGS Conference on African E&P



Africa: Success in Rift, Sag and Passive Margin Settings

Wembley Stadium, London, September 11th-12th, 2013

This annual conference, alternating between London and Houston has established itself as the primary technical E & P conference on Africa, with an attendance regularly exceeding 400. There will be about 25 high quality talks plus a large poster session covering E & P in all regions of Africa. Keynote presentations already confirmed include:

Origin of Palaeozoic Sag Basins - Mike Daly (BP)

Cretaceous Fan Fairway of West Africa - Paul Dailly (Kosmos) and Robin Sutherland (Tullow)
Exploring giant turbiditic reservoirs offshore Mozambique - the ENI experience - F. Fonnesu
African Rifts and Source Rocks - Alain Huc

Details of sponsorship opportunities and display booths will be available from Rebecca Dibley at PESGB office: Email: rebecca@pesgb.org.uk or Tel: +44(0)20 7408 2000

Main Conference on 11th-12th. Additional events on Tuesday 10th include a course 'Petroleum Basins of Sub-Saharan Africa' by D. Macgregor, stadium tours, an evening talk and an icebreaker reception. For details see website www.pesgb.org.uk

Registration will open on 1 April 2013 - Early Bird rates will be available



Background basins image courtesy of the Exploration Fabric of Africa project compiled in memory of Ed Purdy, a former contributor to many African conferences.



HGS International Dinner continued from page 33_

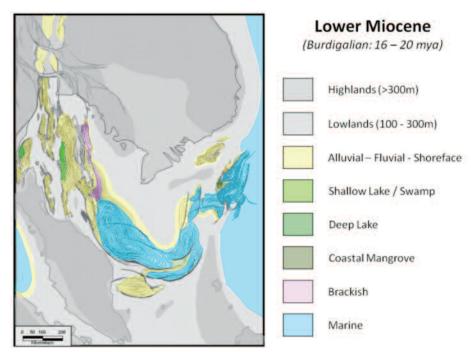
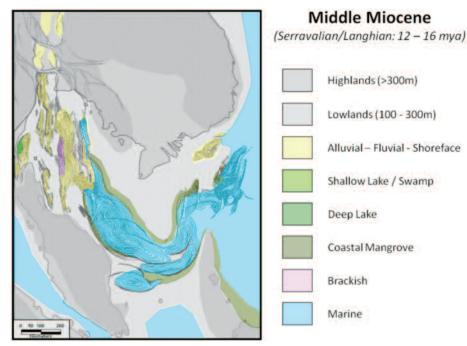


Figure 8: Early Miocene (Burdigalian) paleogeographic map.



In the Middle Miocene, at the precise time of the highest sea levels of the "Middle Miocene thermal maximum," open marine conditions were widespread from offshore Vietnam, indicated by the Mang Cau Formation, throughout West Natuna indicated by the Arang formation, and the southern Malay Basin by Seismic Groups H and F. In the southern Malay Basin, the occurrence of some planktonic assemblages indicates that the water depths reached middle neritic. Restricted, tidallyinfluenced marine conditions indicated by Formation 2D extended northward through to the North Malay and the Khmer Basins. We see the first evidence for marine influence in the Pattani Basin during sea level highstands (Figure 9).

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Figure 9: *Middle Miocene (Serravalian/Langhian) paleogeographic map. Purple areas on Figure 2.*

Biographical Sketch continued

Mr. Shoup is an active contributor in the professional community. He is a Past-President of Bangkok Chapter of the South East Asia Petroleum Exploration Society and of AAPG's Division of Professional Affairs, and past Secretary-Editor of the AAPG House of Delegates. He has served on numerous AAPG Committees and was Chairman of AAPG's Mentor, Membership, and Student Chapter Committees. He was a recipient of AAPG Certificates of Merit in 1990, 1991, and 1998; AAPG's Distinguished Service Award in 2000, the DPA's Distinguished Service Award in 2008, and DPA Life membership in 2010. He currently serves as an ethics lecturer for the DPA.

In 1994, Bob was a nominee for the Pulitzer Prize in drama for his play, *Second Alarm*. He currently teaches various SCA training courses in Houston as well as in the Asia Pacific and Middle East regions.



Second Announcement and Call for Papers



Africa: Success in Rift, Sag and Passive Margin Settings

Wembley Stadium, London, September 11th-12th, 2013

If you wish to submit an abstract for the conference: abstracts (circa 200 words) should be sent as soon as possible and no later than 13 March 2013 to Duncan Macgregor at duncan.macgregor2@ntlworld.com or to a designated Session Chair (see list below). Extended abstracts are normally written once your paper is accepted and are issued on a conference CD.

Session Chairs: Richard Dixon (BP), Shane Cowley (Tullow), Richard Moody, Andrei Belopolsky (Premier), Fabio Lottaroli (ENI), Jon Argent (BG Group), Frank Love (BHP-Billiton)
Other Committee: Ray Bate (Chairman), Al Danforth and Ian Poyntz (HGS, Houston)

There will be about 25 high quality talks plus a large poster session covering E & P in all regions of Africa. Keynote presentations already confirmed include:

Origin of Palaeozoic Sag Basins - Mike Daly (BP)
Cretaceous Fan Fairway of West Africa - Paul Dailly (Kosmos) and Robin Sutherland (Tullow)
Exploring giant turbiditic reservoirs offshore Mozambique - the ENI experience - F. Fonnesu
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Background basins image courtesy of the Exploration Fabric of Africa project compiled in memory of Ed Purdy, a former contributor to many African conferences.



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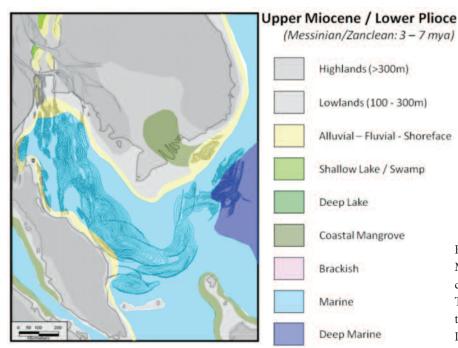


Figure 10: Late Miocene (Messinian/Zanclean) paleogeographic map. Younger yellow areas on Figure 2.

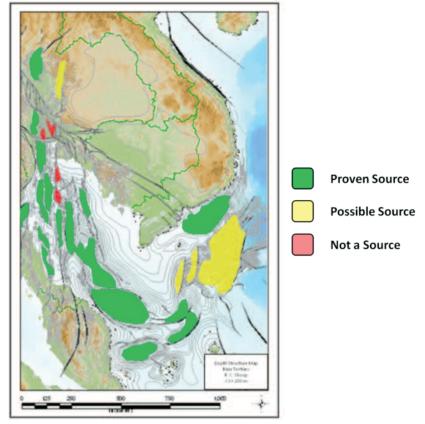


Figure 11: Source Rock Potential, synrift lacustrine source rocks.

By the Late Miocene to Early Pliocene Messinian/Zanclean (3-7 mya) open marine conditions prevail across most of the Gulf of Thailand. Water depths are most-likely similar to present-day water depths of 50 to 70 meters. Deep water conditions occur in the Nam Con Son Basin (Figure 10).

These regional paleogeographic maps can provide insight into the source and reservoir potential of the Tertiary rift basins. Algal-rich synrift lacustrine shales are proven source rocks in most of the rift basins (Figure 11). Several of the western basins were inundated with synrift clastics and did not develop lacustrine source facies. In the Nam Con Son Basin, the synrift lacustrine shales are proven, but are deeply buried, generally over-cooked, and therefore not a viable source rock for portions of the basin.

HGS International Dinner continued on page 39



Petroleum Basins of Sub-Saharan Africa



This one day course presented in conjunction with the PESGB/HGS Africa conference but available for separate registration, aims to provide an overview of the tectonic, climatic and topographic controls exerted on Sub-Saharan petroleum systems and resulting hydrocarbon distribution.

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PESGB Tanqua Karroo field trip, 2007 outcropping turbidite fan systems in foreland setting

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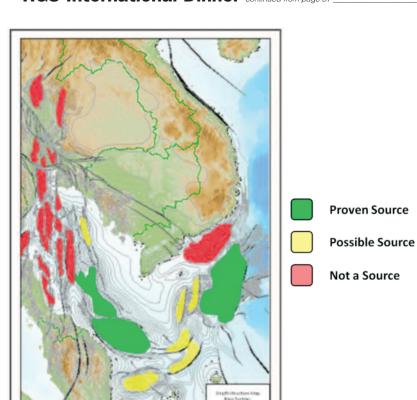
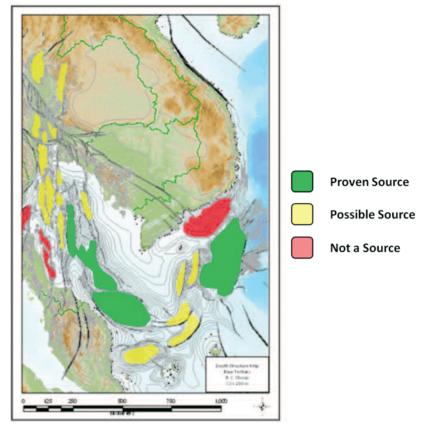


Figure 12: *Source Rock Potential, post-rift coaly source rocks.*



Both the Malay and the Nam Con Son basins have younger coaly source rocks that have contributed to the petroleum system (Figure 12). These coaly source rocks were deposited in both coastal mangroves and in extensive tidal estuarine/upper coastal plain peat swamps. In the Nam Con Son Basin the coaly source rocks are Oligocene to Early Miocene in Age. In the Malay Basin the coaly source rocks are Middle Miocene in age.

Two depositional systems prevalent in the study area are conducive to the development of stratigraphic traps: tidal deltas and anastomosing river systems. Stratigraphic traps associated with anastomosing rivers are prevalent in the Pattani and North Malay basins (Figure 13). In the Malay and Nam Con Son basins, stratigraphic traps associated with tidal bars are prevalent.

Figure 13: Stratigraphic trap

February 2013

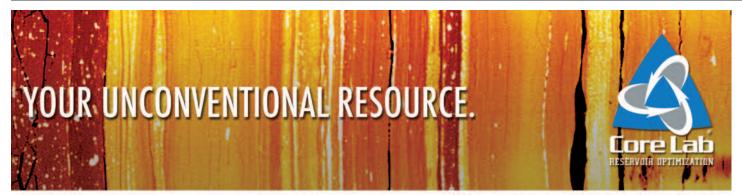
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Monday

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Wednesday

	Members Pre-registered Prices: General Dinner Meeting		
3	4	HGS Board Meeting 6 p.m.	6
10	HGS General Dinner Meeting "Overpressure and hydrocarbon accumulations in Tertiary strata, Gulf Coast of Louisiana", Philip H. Nelson, Westchase Hilton, Houston, TX, Page 21	12	13 HGS Environmental & Engineering Dinner Meeting "The Technical and Practical Aspects of Underground Storage Tank Installation and Repair", Paul R. Dunphey, Black Lab Pub, Houston, TX, Page 25
17	18 HGS International Dinner Meeting "Tectono-stratigraphic Framework and Tertiary Paleogeogeography of Southeast Asia: Gulf of Thailand to South Vietnam Shelf", Robert C Shoup, Westchase Hilton, Houston, TX, Page 27 Applied Geoscience Conference Westin Memorial City, Houston, Page 16	19	20
24	25 HGS North American Dinner Meeting "The Tuscaloosa Marine Shale An Emerging Shale Play", Kirk A. Barrell, Westchase Hilton, Houston, TX, Page 43	26	HGS General Luncheon Meeting "What Are Global Temperatures Doing, and Why Are They Doing It?", Robert C Shoup, Petroleum Club, Houston, TX, Page 47



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28	The HGS prefers that you make your reser	rations: vations on-line through the HGS website at you can e-mail reservations@hgs.org, or call



Upcoming GeoEvents

March 5-6, 2013

2013 GSH-SEG Spring Symposium Unconventional Geophysics Westchase Hilton Houston, Texas

March 5-7, 2013

Challenges in Geoscience Norris Conference Center Houston, Texas

May 6-10, 2013

The 13th Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst Carlsbad, NM

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AAPG Annual Convention & Exhibition David L. Lawrence Convention Center, Pittsburgh, PA

August 12-14, 2013

Unconventional Resources Technology Conference Colorado Convention Center Denver, CO

September 11-12, 2013

12th PESGB / HGS Conference on African E & P *London, UK*

November 6-7, 2013

Applied Geoscience Conference Interdisciplinary Micro to Macroscale Geomechanics LoneStar College Convention Center Houston, TX

April 6-9, 2014

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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.**

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The Tuscaloosa Marine Shale An Emerging Shale Play

lfred C. Moore, a Mississippi wildcatter & geophysical engineer, worked up the first regional project to target the Tuscaloosa Marine Shale (TMS) in 1969. Mr. Moore, a former Sun Oil geophysical engineer, sold the project to colleagues at Sun Oil in 1970 for \$25,000. In 1971, Sun drilled a well in Pike County, Mississippi in which they cored 310 feet of the TMS. The well was plugged as non-commercial after perforating twentyfour feet of the TMS. During the next four

decades, several operators that include

unconventional reservoir.

Callon, UPRC, Worldwide Companies, Petroquest, and Encore, would make attempts to prove the commerciality of this

During the next four decades, several operators ... would make attempts to prove the commerciality of this unconventional reservoir.

Turonian that is, late Cretaceous or 92-94 million years in age. The TMS was deposited during a major transgression during the Tuscaloosa "A" Sequence. The shale, a source rock, occurs above the prolific deep Tuscaloosa sands and averages 150-200 feet in thickness (Figure 1). The basal part of the shale is more siliceous and calcareous than the upper portion. The shale exhibits higher clay content in Mississippi in contrast to higher silica and

calcareous content to the south in Louisiana near the Lower Cretaceous Shelf Margin (Figure 2). Structurally, the TMS exhibits

The Tuscaloosa Marine Shale is uppermost Cenomanian to early

HGS North American Dinner continued on page 45

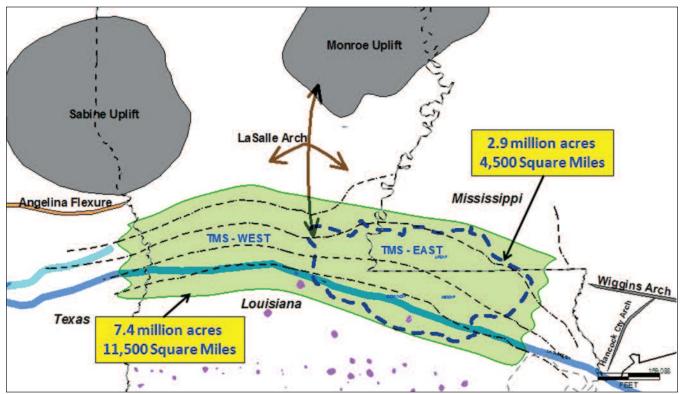


Figure 1: Tectonic features (gray). Base TMS Structure (blacked dashed lines). TMS High Resistivity (blue dashed lines). Salt Domes (purple). Lower Cretaceous Shelf Edge (blue line). [Contour labels and dip information not supplied by author - Ed.]



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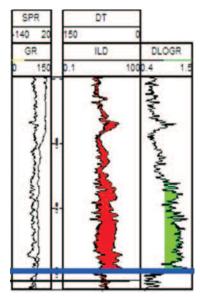


Figure 2: TMS type log.

monoclinal dip from Mississippi down into Louisiana. The boundaries of the Tuscaloosa Marine Shale play are yet to be defined, but 7.4 million acres or 11,500 square miles could eventually be prospective. Drilling new wells and performing additional analyses will lead to the definition of the play boundaries and "sweet spots" where economics will define the full development of the shale.

In 2010, Devon Energy commenced a large lease acquisition effort across the TMS play. Encana followed, along with Goodrich Petroleum, EOG Resources, Indigo Minerals, Justiss Oil, and Halcon Resources. To date, over two million acres have been leased. Devon and Encana have led the drilling efforts across the play; thirteen horizontal wells have been completed over the past eighteen months. The most significant completion to date has been Encana's Anderson 18H #1 well with a thirty-day initial potential of 1,094 barrels of oil equivalent per day. Encana's Anderson 17H #1 well was drilled to a measured depth of 19,547 feet in 39 days. The longest lateral of 8,932 feet was achieved by Encana. None of the recent completions have produced long enough to determine a decline rate, type curve, or recoverable reserves. Twenty-three wells are currently in the permitted or planning stages. Active operators are Encana, Devon, Goodrich, EOG, and Halcon.

At this early stage in the play, economics are unknown. It is estimated that, once the play is fully de-risked and in development mode, costs will range from \$9-12 million per well. Without known initial producing volumes and decline rates, it is currently impossible to determine the economic viability of the play. Accurate prediction of estimated ultimate recoveries will occur after approximately 10-20 wells have produced for over one year and decline rates, hydrocarbon mix, and pressures are confirmed. Once this is established, meaningful economic scenarios and type curves can be generated.

Biographical Sketch

KIRK BARRELL currently serves as the President of Amelia Resources LLC, an oil and gas exploration company focused on Central Louisiana. Mr. Barrell holds geological degrees from Louisiana State University and Texas A&M University. He has worked as a geologist for twenty-three years and explored onshore Louisiana, the Gulf of Mexico, Mississippi, and Texas. He began his career with Amoco Production



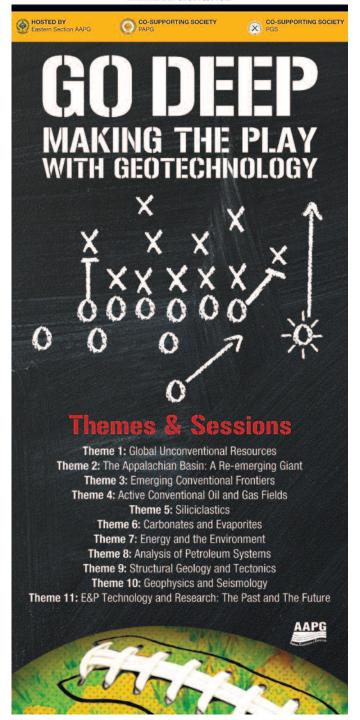
Company and has worked for several small independents in prospect generation geology. At Amoco, he played a primary role in revitalization of the company's key assets in the Tuscaloosa trend. That effort led to the discovery of over 300 billion cubic feet of additional gas equivalent.

Mr. Barrell leads the business efforts for Amelia, where his primary duties include geological and geophysical interpretation, financial management, capitalization, and operational planning. Amelia Resources LLC is currently focused on the Tuscaloosa Marine Shale and Austin Chalk trends across Central Louisiana. Kirk publishes a blog, "Tuscaloosa Trend," that focuses on oil and gas activity across Central Louisiana (www.tuscaloosatrend.blogspot.com).

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HGS General

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Robert C. Shoup Subsurface Consultants and Associates LLC

What Are Global Temperatures Doing, and Why Are They Doing It?

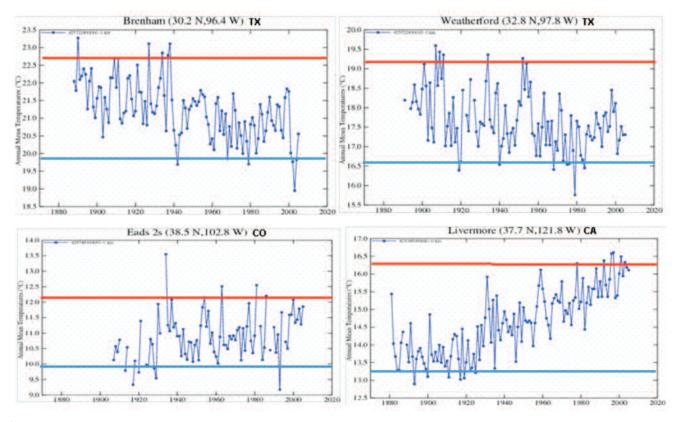


Figure 1: Temperature data for four recording stations in the United States. Are average temperatures increasing, flat or decreasing?

This talk will address four questions that pertain to global warming:

What are temperatures actually doing?

What is causing temperatures to do what they are doing?

What will temperatures do?

What is the impact of climate on humans?

What are temperatures actually doing?

The answer to this question should be reasonably straightforward, but it is not. An examination of the various average temperature profiles from Mann to NASA to NOAA to Hadley reveal that each one differs from the others, sometimes significantly so. One reason

is that the averages that are plotted are not simply arithmetic averages. They are constructed from a subset of the total data and include extrapolated data as well as modified data. We will examine the various curves as well as individual temperature station data to determine what temperatures are actually doing.

What causes temperatures to do what they are doing?

The cause of the recent warming trend has been ascribed to increased levels of CO_2 associated with the burning of fossil fuels. We will examine CO_2 , as well as other potential causes of climate change to see which factors have the most impact on climate.

HGS General Luncheon continued on page 49

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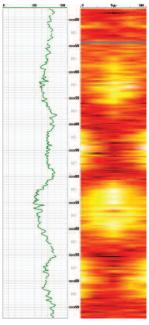
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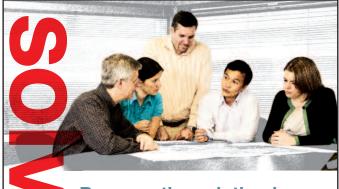
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HGS General Luncheon continued from page 47

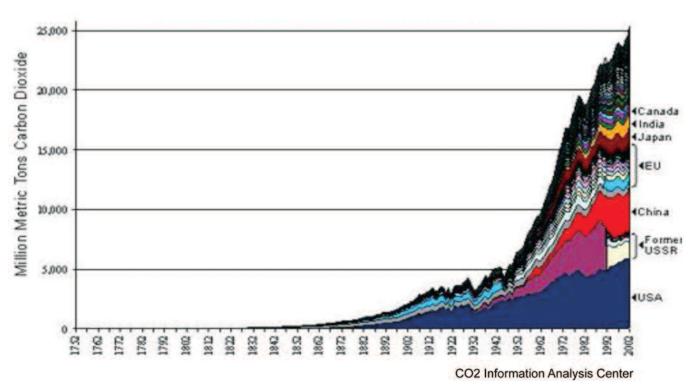


Figure 2: Global CO₂ emissions from fossil fuel burning, cement manufacture, and gas flaring. Is this the global warming smoking gun or a toy pistol?

What will temperatures do?

The IPCC and others state with a high degree of certainty that temperatures will increase. We'll examine the data to see if this is reasonable, or if alternative scenarios are possible or more likely.

What is the impact of climate on humans?

Predictions for the future have been dire, bordering on catastrophic. We'll examine the predictions versus the reality. Finally, we'll close with a look at history to see if we are better off with a warm or cold climate.

Biographical Sketch

BOB SHOUP is a Board Certified Petroleum Geologist with over 30 years' experience in basin analysis, regional studies, new play generation, prospect evaluation, field studies and development planning, drilling operations, and project management. Mr. Shoup began his career at Shell Oil in 1980. He worked for private oil companies for four years before becoming an independent



consultant in 2003, working in Thailand, Malaysia, Vietnam, and

New Zealand. He joined Subsurface Consultants & Associates's Training Department in 2012. He is a proven oil finder with a 46% exploration success rate and over 100 MMBOE of discovered resources; and is a recognized expert in clastic depositional environments, rift basins, and syndepositional structural systems.

Mr. Shoup is an active contributor in the professional community. He is a Past-President of Bangkok Chapter of the South East Asia Petroleum Exploration Society and of AAPG's Division of Professional Affairs, and past Secretary-Editor of the AAPG House of Delegates. He has served on numerous AAPG Committees and was Chairman of AAPG's Mentor, Membership, and Student Chapter Committees. He was a recipient of AAPG Certificates of Merit in 1990, 1991, and 1998; AAPG's Distinguished Service Award in 2000, the DPA's Distinguished Service Award in 2008, and DPA Life membership in 2010. He currently serves as an ethics lecturer for the DPA.

In 1994, Bob was a nominee for the Pulitzer Prize in drama for his play, *Second Alarm.* He currently teaches various SCA training courses in Houston as well as in the Asia Pacific and Middle East regions.





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SIPES February Luncheon Meeting Diagnostic Environmental Parameters that Differentiate Sources of Water and Gases Relevant to Hydraulic Fracturing

by John W. Oneacre, Ground Water Solutions, Ltd.

The rapid development of unconventional energy resources has brought new supplies of gas into the marketplace. However, along with this development of unconventional energy resources, claims of ground water contamination from hydraulic fracturing have been made by well owners, environmental groups, a documentary film producer, and researchers. Historically, extensive sampling and analysis of private water wells have not occurred. Well owners understandably may be surprised to discover the types and amounts of naturally occurring constituents in their drinking water. Additionally many private wells can have inherent problems with well construction, and maintenance. For example, a poor surface seal can allow infiltration of surface water contaminants such as coliform bacteria. Sulfate reducing bacteria can be the source of hydrogen sulfide, imparting the notable "rotten egg" odor. Well owners may mistakenly assume that these well issues are due to outside influences such as hydraulic fracturing.

Naturally Occurring Methane Studies

*Alberta, Canada - ~ 60% of water wells had NOM

*West Virginia- ~ 77% of water wells tested had NOM

*San Juan Basin- ~ 33% of wells had NOM

*Pennsylvania- ~ 40% of wells estimated to have some gas; Cabot found that 80% of wells in 60 mi² area had measurable NOM

*Illinois- State found NOM in glacial moraines

*Louisiana- State found NOM from CBM in water wells

*Texas- NOM associated with major aquifer

Note: NOM = Naturally occuring methane, CBM = Coal bed methane.

Although the hydraulic fracturing process has never been shown to cause ground water contamination in nearly seventy years of application, problems associated with drilling, cementing, and fluid management can affect ground water. The challenge for hydrogeologists is to use sound scientific approaches to determine whether constituents in ground water are naturally occurring or influenced by other factors. This presentation will identify specific parameters that hydrogeologists can use to help differentiate sources of water and gases. Specific parameters that can help differentiate sources include isotopes such as ²H and ¹³C, ¹⁸O, noble gases including helium and argon, mole fractions, gas wetness fraction, and various ratios such as the methane/ethane + propane ratio.

Biographical Sketch



MR. ONEACRE has 38 years of professional experience in hydrogeology, engineering geology, and environmental geology. During his career, Mr. Oneacre has worked at a large oil company and a major solid waste company, both Fortune 500 companies. His experience has covered a broad range of projects in more than a dozen countries; projects include hydrogeological studies at landfills, National Priority List (NPL) Superfund sites, mine sites, and petrochemical sites. Mr. Oneacre has given professional lectures at the invitation of several universities, State and Federal regulatory agencies, scientific organizations, and international regulatory agencies.

Since incorporation of Ground Water Solutions in 1999, Mr. Oneacre has offered his expertise to industrial clients faced with various hydrogeological challenges. His technical approach to projects has garnered award

recognition from an industrial client for innovation and cost-effective solutions. Mr. Oneacre has also provided expert witness services on behalf of several industrial clients.

Mr. Oneacre holds a Bachelor of Science degree in Geology and a Master of Science degree in Geology, both from Kent State University.

Thursday, February 21, 2013

Houston Petroleum Club in the Discovery Room, 800 Bell St. (downtown Houston). Social 11:15 AM, Luncheon 12 noon **Reservations Required:** Make reservations by telephone (713-651-1639), fax (713-951-9659), website (www.sipes-houston.org), or e-mail bkspee@aol.com to B. K. Starbuck-Buongiorno by 12:00 noon on Tuesday preceding the meeting. You can now sign up for the meeting online at www.sipes-houston.org, but payment is still required by regular mail or at the door.

Cost: \$30 for SIPES Members and Chapter Affiliates who register by 12:00 Noon Tuesday; \$35 for new registrations at the door. The price for guests, non-members and walk-ins is \$35. No-shows will be billed.





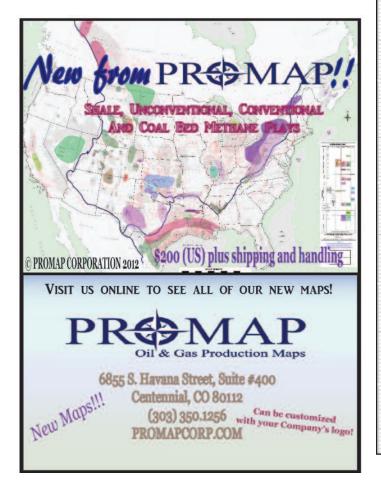
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Government Update

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 Government Affairs Monthly Review (November 2012)

President Obama on Outlook for Climate Change Action

In his first press conference since his re-election, President Obama responded to a question about the outlook on climate change action in his second term in light of Superstorm Sandy. President Obama reiterated his commitment to addressing climate change while admitting "we haven't done as much as we need to," and "some tough political choices" are necessary to "take on climate change in a serious way."

Obama said that that while "we can't attribute any particular weather event to climate change," global temperature is "increasing faster than was predicted," in addition "the Arctic ice cap is melting faster than was predicted," and "there have been an extraordinarily large number of severe weather events here in North America" as well as "around the globe." In his first term, Obama said he doubled fuel efficiency standards for cars and trucks, doubled clean energy production and invested "in potential breakthrough technologies that could further remove carbon from our atmosphere."

"But, we haven't done as much as we need to," Obama acknowledged. Obama said early in his second term he would converse "with scientists, engineers, and elected officials" on what more can be done to combat climate change on the short-term. Then, he will begin "a discussion...across the country about what realistically can we do long-term to make sure that this is not something we're passing on to future generations that's going to be very expensive and very painful to deal with."

Outlook for Science Legislation in the 113th Congress

The 113th Congress will be tasked with the reauthorization of the America COMPETES Act (P.L. 111-358), reauthorization of the National Aeronautics and Space Administration (NASA), the closing of the Federal Helium Reserve, regulations related to unconventional oil and gas development and climate change. Notable leadership updates include the appointment of Representative Lamar Smith (R-TX) to replace Ralph Hall (R-TX) as chair of the House Science, Space, and Technology Committee.

The America COMPETES Act is set to expire in the fall of 2013. The act was first passed in 2007 (P.L. 110-69), and then reauthorized in 2010 (P.L. 111-358). The act promotes science education through governance and support for science and

education programs through the National Science Foundation (NSF), National Institute of Standards and Technology (NIST) and the Department of Energy (DOE). Among the provisions in the 2010 reauthorization is a 10-year doubling of these three key federal agencies budgets', which has yet to be realized.

The current NASA authorization passed in 2010 (P.L. 111-267) expires in 2013. Chairman Smith will lead the effort in the House to set the policy and authorization levels for NASA.

The Federal Helium Reserve is currently on track to close in 2013 which would devastate the helium market. Senator Jeff Bingaman (D-NM) introduced the Helium Stewardship Act of 2012 (S. 2374) which would continue to fund the Federal Helium Reserve as the helium market transitions to reliance on helium from private industry. If Congress does not pass S. 2374 this December, look for similar legislation to be introduced early next year.

The next Congress will shape the role of unconventional oil and gas production in decreasing dependence on imported energy. The United States has the largest shale energy resources of any country. Because of recent technological advances in hydraulic fracturing and horizontal drilling, the United States is poised to overtake Saudi Arabia as the world's top producer of oil by 2020. However unconventional energy production remains controversial due to uncertain environmental impacts, especially regarding water use.

Bill Introduced to Fund DOE Oil Shale Energy R&D Program

The House Science, Space and Technology Committee Chairman Ralph Hall (R-TX) introduced a bill, the Tapping America's Energy Potential through Research and Development Act of 2012 (H.R. 6603), to authorize \$111 million to the Department of Energy to research and develop oil shale energy extraction. The bill focuses on funding research and development (R&D) for extracting methods and reducing environmental impacts.

The bill authorizes support for R&D in oil and shale resource characterizations, modeling and simulation of oil shale exploration and production technologies, minimization and re-use of water, efficient use of energy in exploration and production activities, and methods which reduce potential environmental impacts. If the bill is not passed in the lame duck session, it must be reintroduced in the 113th Congress.

Government Update continued on page 55

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Government Update continued from page 53

United States and Mexico Sign Colorado River Agreement

On November 19, 2012 officials from the United States and Mexico signed an updated agreement on managing Colorado River water resources.

The United States and Mexico have agreed to plan for future drought by allowing Mexico to store water in Lake Mead during times of water surplus in return for tapping less water from the River during dry periods. Under the five-year agreement, Mexico will receive \$21 million for repairs to irrigation canals and other infrastructure damaged by an earthquake in 2010. Such repairs will allow agricultural production to resume on thousands of acres of farmland which has dried up.

Arizona, California and Nevada, the three lower basin states, will purchase about 100,000 acre-feet of water from Mexico, which would provide water for 200,000 homes for a year. The United States pledged to buy additional water to support restoration of the Colorado River Delta. Over the decades, areas of the delta have dried up due to diversions down stream causing agricultural lands to become infertile as well.

World Bank Releases Report on Climate Change and **Poverty**

The World Bank has released a report, "Turn Down the Heat," which presents the latest scientific knowledge on climate change and warns we are on a path to a 4° Celsius (7.2° Fahrenheit) warmer world by the end of the century — a world in which some nations may be unable to deal with or recover from disasters.

While policy makers have set a goal of curbing warming to 2° Celsius, the report warns that without "serious policy changes" the world will warm 4° Celsius compared to pre-industrial levels. While "no nation will be immune to the impacts of climate change," the report says, "The distribution of impacts is likely to be inherently unequal and tilted against many of the world's poorest regions, which have the least economic, institutional, scientific, and technical capacity to cope and adapt."

Impacts of a 4° Celsius warmer world include "the inundation of coastal cities," threats to food production, "many dry regions becoming dryer" and "wet regions wetter," "unprecedented heat

Government Update continued on page 57

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26-27 February 2013 • Fort Worth, TX

Water concerns are intensifying as issues around hydraulic fracturing, new regulations, drought, and surface water management continue to dominate the public. Join us for presentations, intensive discussions, and a review of new and emerging technologies that address current and anticipated problems.

Eagle Ford Shale

18-20 March 2013 • San Antonio, TX

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Government Update continued from page 55.

waves," intensified water scarcity, "increased frequency of highintensity tropical cyclones" and "irreversible loss of biodiversity, including coral reef systems." These climate impacts will arrive in conjunction with and exacerbate the effects of "increasing stresses and demands on a planetary ecosystem already approaching critical limits and boundaries." The impacts of a 4° Celsius warmer world have the potential to be overwhelming "to a point where adaptation is no longer possible, and dislocation is forced" for some nations.

"The lack of action on climate change not only risks putting prosperity out of reach of millions of people in the developing world, it threatens to roll back decades of sustainable development," the report warns.

First Arctic Crossing Attempt by LNG Tanker

The Ob River, a liquid natural gas (LNG) tanker set sail from Norway in November and arrived in Japan in early December after crossing the Arctic. This is the first ship of its kind to attempt the crossing, which has been made possible by melting in the Arctic region and spurred on by the United States shale gas revolution and increase in demand from Asia.

Ob River, chartered by Russian energy company, Gazprom, from Dynagas Ltd, can carry 5.3 million cubic feet of gas and has a 40person crew. For much of the journey Ob River was accompanied by a Russian nuclear-powered icebreaker. Crossing the Arctic shortens the voyage from Norway to Japan by about three weeks compared to travel through the Mediterranean Sea and Suez Canal before proceeding around Asia.

A major driver of utilization of the Arctic for such a crossing is the potential to access and export the wealth of energy resources available in the Arctic. Another major driver is the boom in shale gas production in the United States, which has decreased LNG imports to the United States, making the trek a more profitable venture. Finally, concerns over nuclear power in Japan. after the March, 2011 tsunami, has increased the demand for natural gas.

Key Reports and Publications National Academy of Sciences (NAS)

Climate and Social Stress: Implications for Security Analysis In this report, the National Research Council (NRC) discusses the connection between climate change and United States national security and identifies ways for the intelligence community to increase their ability to account for and assess political and social stresses that arise from climate change that have national security implications for the United States.

Government Update continued on page 59

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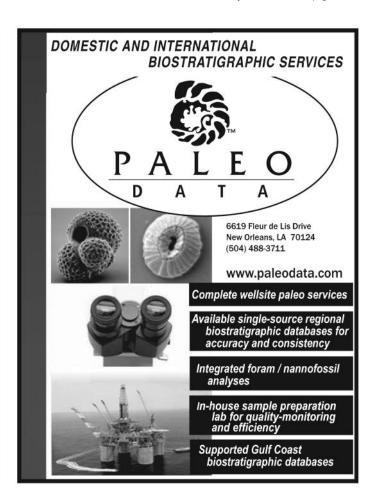
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Government Update continued from page 57_

Climate change is expected to "increase the frequency and intensity of a variety of potentially disruptive environmental events" at an increasing rate. The consequences of some events will "exceed the capacity of affected societies or global systems to manage" which may have "global security implications."

The report recommends a "whole-of-government approach" to increased understanding of the connections between climate and security and informed choices regarding adaptation and reduced vulnerability to climate change impacts.

Climate Change: Evidence, Impacts, and Choices

The National Academies has released a booklet, which reviews the evidence for human-caused climate change, explains some of the impacts, and examines how science can inform decision-makers. The booklet is based on National Research Council reports. First, the booklet summarizes the current state of knowledge about climate change, and addresses common questions about the science of climate change. The evidence indicates that human activities are responsible for most of the changes in climate observed around the globe, the booklet says.

Second, climate change projections for this century and beyond are covered. This includes how temperature, precipitation, sea ice, snow, coastlines, ecosystems and food production will be impacted. Finally, the booklet examines how science can inform decisions about reduction and management of the consequences of climate change.

Alternatives for Managing the Nation's Complex Contaminated Groundwater Sites

The National Research Council has released a report, which makes recommendations for hazardous waste sites considered complex, meaning restoration is unlikely in the next 50 to 100 years owing to technological limitations.

Despite 40 years of effort, thousands of hazardous waste sites across the United States are contaminated with chemicals that have caused the underlying groundwater to have contaminant levels above drinking water standards. This includes Superfund sites as well as other sites where hazardous waste is exposed and includes numerous military facilities, and active and inactive dry cleaners. While many sites have been closed, remaining sites are often more difficult to address because the contamination and subsurface conditions complicate remediation.

The report concludes that at least 126,000 sites across the United States have contaminated groundwater and will cost a minimum of \$110 billion to \$127 billion to close. About 10 percent of these sites are complex. For sites where contaminant concentrations have leveled-off at levels that surpass cleanup goals, the report recommends evaluation of whether the site should transition to being managed over the long-term.

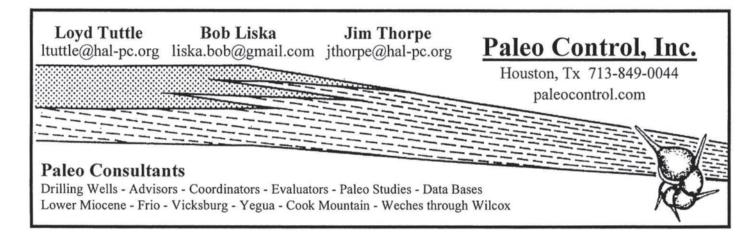
Science for Environmental Protection: The Road Ahead

In this report, the National Research Council assessed the Environmental Protection Agency's (EPA) capabilities to develop, obtain, and utilize the best available science, technology, and tools to address the persistent, emerging, and future operations and opportunities.

The report found that tensions inherent to the structure of how the EPA handles their work contributes to the ongoing challenges faced by the agency. Meeting those challenges will require a more deliberate, interdisciplinary, "systems thinking" approach in developing cuttingedge scientific methods, tools and technologies, the report says.

Outlined in the report is a framework for providing environmental protection through the next 10 years. The report calls for enhanced leadership capacity to strengthen the EPA's ability to address current and future environmental challenges, in addition to utilize new tools and technologies to address them.

The report concludes that the EPA science foundation is strong but the agency addresses these challenges to maintain science leadership and meet future obligations.





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HGS Bulletin Instructions to Authors

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.

<u>Text</u> 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.

<u>Photographs</u> 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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For more information regarding website advertising visit HGS.org or email nina@hgs.org.

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HGS Secretary

Houston Petroleum Auxiliary Council News

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



February is a month of traditions and this is especially true for our HPAC members as we enjoy our annual Game Day. Game Day was the Houston Geological Auxiliary brain child of Gwinn Causey back in the early nineties. Of course, any good idea is only successful if you find an excellent captain and Gwinn turned to Daisy Wood, our own leader extraordinaire, to ensure that success.

We are now in our third decade of Game Day and Daisy continues to grow that success. This year our Game Day will be on February 5th at the Braeburn Country Club with Hostesses **Daisy Wood** and **Pat Burkman**, assisted by **Linnie Ewards**, **Suzanne Howell, Lois Matuszak, Norma Roady, Millie Tonn** and **Cherry Yvette**. Beyond just bridge, the games being enjoyed include kings in the corner, chicken foot, and a table of mahjong has been known to appear. This is a wonderful time with a great lunch and loads of door prizes. Guests are welcome — just give Daisy a call at 832-581-3231 and don't miss the fun!

Our featured interest group this month is our monthly Third Wednesday Bridge Group also with chair **Daisy Wood** who coordinates the event with the Petroleum Club of Houston — an invigorating venue in which to play bridge. The group has up to eight tables and is a mix of levels of play and personalities. If you are a novice, this is a good place to start; if you are an established player, you will find others on your level. You cannot beat the value, The \$30 tariff includes cards, coffee and tea, buffet

lunch in the Wildcat Grill, valet parking, tax and gratuity. What a great price for all that, plus a day of fun and fellowship at the Petroleum Club.

The Book Club will be meeting February 4th in the home of **Kathi Hilterman**. **Sandra Pezzetta** will lead the discussion on our book for the month, *Pearl of China* by Anchee Min. To quote the San Francisco Chronicle: "Min skillfully blends real historical figures with fictional characters and pays worthy homage to Pearl Buck's legacy." With all the interest in strings, there seems to be one that runs through the club's selection of books. Can our geological readers identify it? Thanks to our Chairs **Phyllis Carter** and **Anita Weiner** for all their contributions.

Remember that in addition to our regular luncheon programs and these special interest groups, we have other interest groups: Cinco Mas Bridge: Audrey Tompkins, 713-868-0005, and HPAC Exploring Houston: Martha Lou Broussard, 713-665-4428 or Linnie Edwards, 713-785-7115. Spouses and guests are also welcome to attend these events.

Geologists, please encourage your spouses to join HPAC, where they will have the 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*. Please contact **Edie Bishop** at 713-467-8707 or at ewbishop@bishorb.com.



You are invited to become a member of

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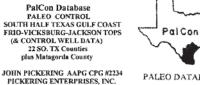


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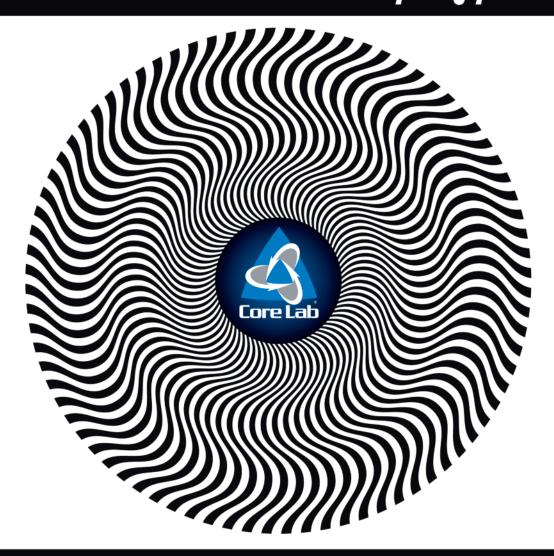
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