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In Every Issue

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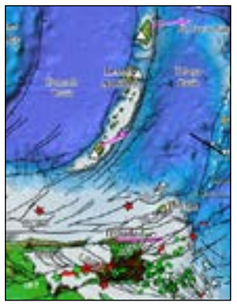

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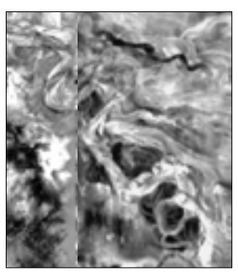

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About the Cover: NASA Earth Observatory image by Joshua Stevens, using MODIS data from LANCE/EOSDIS Rapid Response. See page 41 for more information.

HGS Scholarship Night & Dinner

HGS Foundation Scholarship & Calvert Memorial Fund

February 13, 2017

Speaker: Paul Britt - AAPG President

Amy Atwater - Big Bend Paleontology Fellowship Awardee

Eileah Sims - Big Bend Paelontology Fellowship Awardee

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HOUSTON GEOLOGICAL SOCIETY

Scholarship Night & Dinner Meeting

HGS Foundation Scholarship
Calvert Memorial Fund Scholarship

Monday, February 13, 2017
5:30pm – 9:00pm

Speakers
Paul Britt - AAPG President
Amy Atwater – Big Bend Paleontology Fellowship Awardee
Eileah Sims – Big Bend Paleontology Fellowship Awardee

Hilton Westchase
9999 Westheimer Rd
Houston, TX 77024

Cash bar starts at 5:30pm

Please join us on this evening to recognize HGS Scholarship Winners over the current fiscal year. We will also recognize Amy Atwater and Eileah Sims who recently completed Paleontology Fellowships at Big Bend National Park that were sponsored by HGS. Both will present summaries of their work. In addition, AAPG President Paul Britt will give a presentation on AAPG student programs. We hope you can join us.

John Adamick - HGS Foundation Chairman
Carl Norman - Calvert Memorial Scholarship Chairman

This HGS special event has limited seating. Registration is now open. Please make your reservations online at www.hgs.org. Tickets are $50 per person.

Be a Corporate Sponsor!

Please contact the HGS office, 713-463-9476, or email Office@hgs.org for information on sponsorship opportunities.

All event profits benefit the HGS Foundation and Calvert Memorial Scholarship Funds.

John Jordan
john.jordan@hgs.org

Stages of Life–Value of Membership

If you are reading this HGS President's page, it is clear that you are either a current member of the HGS or have been one in the recent past. Membership is declining across the board. It does not matter what the acronym represents: Texas Board of Professional Geologists (TBPG), American Association of Petroleum Geologists (AAPG), Society of Exploration Geophysicists(SEG), Geological Society of Houston (GSH), or the Houston Geological Society (HGS); people are just not joining and or keeping their existing memberships. Retention is one of the biggest challenges the HGS and other professional societies face. Should we consider being members of the HGS for life? It is easy to justify our membership in organizations similar to the HGS when we are students or working professionals, but what about once you have retired?

Student members are the future of any organization, including the HGS. Students join our society to gain access to valuable information about current geological concepts and meet geoscientists working in the profession they have chosen to pursue. Geology is a broad subject; this is why we have so many different groups that meet each month. The HGS provides subsidies for student membership and attendance to our meetings. We even offer a transition membership for students moving into to the working world. Yet, our history of moving students to full active members is not great. I encourage you to talk to the young professionals just starting out in your organization about the reasons you hold professional memberships in geoscience societies and ask for ideas from them on how we can be relevant to them as 21st century geoscientists.

If students are the future, then the everyday working professional geoscientists are the life blood of our professional societies.

If students are the future, then the everyday working professional geoscientists are the life blood of our professional societies. These people join and maintain their professional memberships because it keeps them current on all aspects of geoscience. Their service to the organization is priceless; whether they are chairing a committee, organizing a golf tournament or checking in guests at a technical meeting. They also see the value in networking and making new, often lifelong friends at other companies. The HGS provides these opportunities through our low cost monthly meetings, short courses, social events, conferences and our publication, the HGS *Bulletin*. There is great value in an HGS membership at $28 per year.

Once we have retired (many of us are making this transition), why keep up our professional society memberships that we maintained while we were working? Yes, I have heard the old adage "Geologists never die – they just become fossils." However, I believe that we can rewrite this to say "Geoscientists never retire – they just become multifaceted." What I am trying to say is that we wake up and walk out into our laboratory every day and make new observations. Being a geoscientist is not just a profession, it is in our DNA. Just because we have retired does not cause us to turn our geological brains off! Organizations like the HGS allow you to keep current in your geoscience thinking, a subject to which all of us have dedicated much of our lives. It is also an opportunity to reunite with old acquaintances and business colleagues. Isolation and boredom are the enemies of the retiree. It is said that exercising your brain keeps you young and that interacting with young people is stimulating too. The HGS provides avenues for interaction with working professionals and opportunities for mentoring working professionals. Your dream may be to combine mountain biking with field geology. Get involved and make it happen! Perhaps you are a recently retired expert in petrophysics or seismic interpretation. Teach a class; or if you don't know much about the topic, take a class! Learning how to put together prospects to sell as an independent or how to write a contract to help you avoid bankruptcy is also very important. Share your knowledge with others and gain some for yourself. The HGS is where you can make these things happen.

There are many of you that are receiving the HGS *Bulletin* that have not renewed your membership. Hopefully, this President's page will encourage you to renew your HGS membership or other professional society memberships that were once important to you and may have lapsed.

Tami B. Shannon
tami.hgs@gmail.com

Thank You So Much to All Those Who Contribute to the Content and the Quality of the HGS *Bulletin*

I never truly understood the magnitude of time and effort it took to put together a quality publication like our beloved *Bulletin* until I became its editor. Even when I spent a year mentoring for the position, I was not always privy to the sheer amount of information that crosses the Editor's desk (that was probably for the best, since if I had known – I may have reconsidered accepting the role altogether).

The *Bulletin* is not simply a newsletter that one can slap together at the end of the week; and while it is not a full-fledged journal either, I think of it as a musical composition - with many people required to ensure all the different instrumental components are tuned and in place – I am simply the conductor to help it flow together. The editor gets most of the notoriety (good or bad as the composition may be); however, the HGS is fortunate to have an enormous volunteer support system to help preserve the *Bulletin*'s quality – and it is to them I am grateful and appreciative.

First, thank you to Ms. Lisa Krueger, Design Editor with Lisa Krueger Design, who puts the *Bulletin* layout together each and every month. She has done this every month since September 2003 and is invaluable to its production.

Thank you to the HGS Office Manager, Andrea Peoples, for helping to coordinate and manage the advertising content for the *Bulletin* and the website, and of course, thank you to all the HGS Committee Chairs and Board Members who provide the critical content to keep the *Bulletin* current and exciting.

It was my honor this year to have past Editors Dave Miller (2014) and Jon Blickwede (2015), and Mr. Ed Marks, Emeritus (member since 2006) gracing me with their previous editorial expertise and guidance as my Advisory Editors. They have saved me on numerous occasions from the split infinitive (no joke) and I would like to offer them a very, very special thank you for all their dedication and help. ■

Charles Revilla
Thank You for Over 20 years of Editorial Service!

Mr. Charles E. Revilla joined HGS in January, 1978. With over four decades of membership, his passion for the HGS *Bulletin* has been relentless. He has written and published several articles for the "Geotales from Far Away" column in the *Bulletin* from 1990 – 2002 (mainly 'geological travelogues' as he refers to them .)

In November 2006, he wrote a column for the *Bulletin* called "On the Lighter Side"- which consisted of quips, some very bad poetry, and some only slightly exaggerated stories. He also

wrote articles for a column titled "In the News" which provided the members with a variety of geological news from other societies, from local and national newspapers, and from various government agencies engaged in geoscience research.

Charlie spent over 20 consecutive years conscientiously reviewing, proofing and of occasional light editing of the text of the *Bulletin* as an Advisory Editor. Charlie resigned from the position in late 2015, so I didn't get the esteemed pleasure of working with him, but I am still a

From the Editor *continued on page 8*

From the Editor continued from page 7

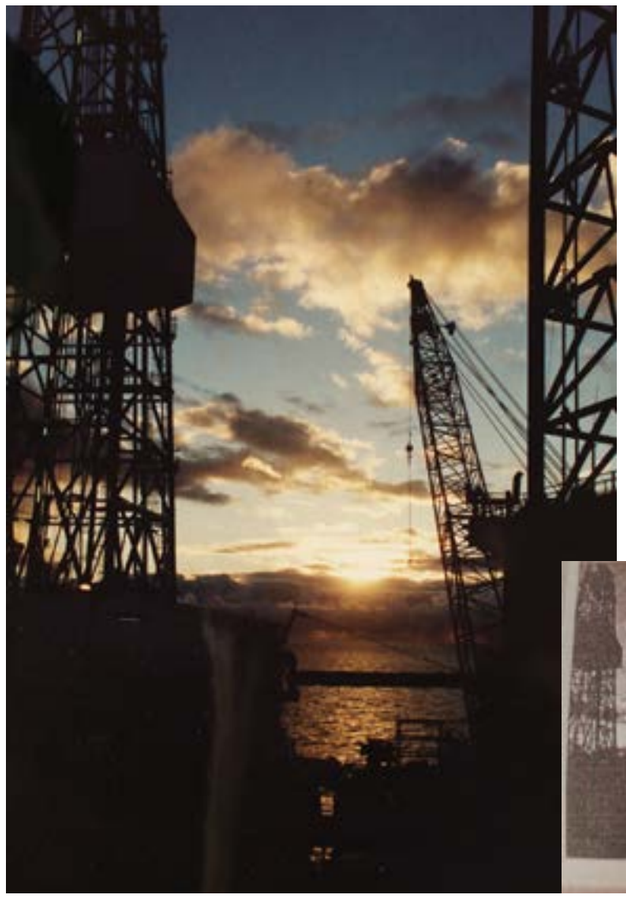
recipient of his suggestions and articles. Charlie has truly been a dedicated member to the Society (he received the 2007 President's Award and the 2015 Outstanding Board Member Award), and his friends fondly recognize him for his hard work and dedication. Thank you, Charlie!!

"…It was a privilege to have such an opportunity…I am 90 years old, over nearly 40 years of membership have been able to appreciate the tremendous progress made in this publication's format and the usually excellent and all-inclusive nature of its choice of content, and I continue interested in the Society…"

Charles Revilla – in an email to the editor, November 2016.

"Charles is a fine gentleman and a master of the English language."

Steve Earle, HGS *Bulletin* Editor 2007-2008,
HGS *Bulletin*, June 2008.



"After most of the things to be published are in, they get reviewed and briefly edited by the Editor. Then they go out to the Advisory Editors for proofreading. There are three Advisory Editors, Elsa Kapitan-White, Jim Ragsdale and Charles Revilla. They are the unsung heroes of the *Bulletin*, because without their help, the *Bulletin* would appear a lot different. They edit for consistency, readability, grammar, punctuation and more. And they read it at least twice, as you will see in a minute. Then they send back their edits to the Editor, who compiles the three versions into one proof copy for layout, adding his or her edits along the way"

Paul Britt, HGS *Bulletin* Editor 2005-2006,
HGS *Bulletin,* June 2006
https://www.hgs.org/node/4159.

"Charles Revilla has long enjoyed the reviewing and light editing earth science copy. After 15 years as an editor and occasional contributor to the HGS *Bulletin*, he takes pride in being a 'necessary rung' in the ladder, and in the knowledge that his efforts end up in the *Bulletin* readers' hands."

Patricia Santogrossi, HGS *Bulletin* Editor. 2012-2013,
"The Art or Science of Editing", September 2012.

"Mr. Charles E. Revilla has been a dear friend of ours since New Year's Day, January 1, 1953. We worked together in the plains and countryside of Northwest Peru in the city of Talara. Talara is a port city serving much of that area. We worked together in the laboratories of International Petroleum Company, a subsidiary of what is now called Exxon-Mobil. In many instances, we traveled together in the backcountry of Peru, visiting wells being drilled for oil and related fuels.

Mr. Revilla was very helpful to me, this beginning well-site geologist, and helped me with many problems. He is, and was, instrumental in giving aid to many of the native Peruvians in their desire to improve their lot.

We worked together for close to three years in Peru, and renewed our friendship when my wife and children made a geological and stratigraphic trip to Europe in 1969. When we moved back to Houston in 2006, we were able to visit with each other, especially with other "Talareños," we who used to work in Talara.

He is married to a lovely Argentine lady, Erna, and has two brilliant children, Bettina and Paul."

Irene and Ed Marks, December 2016.

"Charles has been a member of the HGS since 1978. He has served on the Editorial Advisory Board for the HGS *Bulletin* since 1995 and has contributed articles and cover photos for the *Bulletin* since 1990. Charlie successfully ran for Editor Elect in 1999, but was unable to complete his term.

Charlie's careful editing skills have been instrumental in maintaining the high standards of the *Bulletin* for the past 2 decades. The time that he spends behind the scenes on each issue of the *Bulletin* is significant and his edits are "spot-on". He is able to improve the quality of the written submittals to the *Bulletin* and has an amazing eye for detail. His encouragement, enthusiasm, knowledge and good humor are appreciated by everyone who has been fortunate to work with him."

David Miller, HGS *Bulletin* Editor, 2014-2015

"Two gentlemen have worked tirelessly for HGS to take the initial drafts received to a level that ensures that the content of the *Bulletin* is sharp, clear, and concise. Both James Ragsdale and Charles Revilla have reviewed and commented on nearly every article published in the *Bulletin* this year. These two gentlemen have each reviewed more than 100 abstracts, news articles, technical notes, and biographies this year alone."

Barry Katz, HGS *Bulletin* Editor, 2009-2011
HGS *Bulletin,* June 2010

On the Lighter Side (Reprinted from HGS *Bulletin*, November 2006)

by ***Charles Rivella***

The Pterosaur of Ptexas

Of all the saurians that made the Mesozoic scene,
Like *Stegosaurus* (stupid) and *Tyrannosaurus* (mean),
Brontosaurus (greedy, and the no. 1 in size),
My favorite is the *Pterosaur*, of friendly Ptexas skies.

Some 60 million years ago, above the bleak pterrain,
This monstrous creature glided like a strange unearthly plane.
He had a ptricky ptake-off when departing on a ptrip,
For his wingspan measured 47 feet from ptip to ptip.

Out in front he had a set of quite unbirdlike pteeth,
No feathers had this proto-bird, above or underneath.
His wings were merely skinny flaps, much like a leather sail.
The landing gear was primitive—the creature had no ptail.

His head was ornamented with a pointed bony crest,
His scrawny neck was hardly more than functional, at best.
In fact, his whole construction was dynamically wrong,
But this he didn't notice as he Ptero-soared along.

Oh, the eagle is a might bird, he is our symbol bold,
The condor wheels majestically above the mountain's fold,
The albatross can cruise a thousand miles across the sea —
But the Pterosaur of Ptexas is the only bird for me!*

*****

*If you are really depraved and can carry a tune, you can sing this to "The Yellow Rose of Texas" Permission to reprint the poem in a newsletter was also given to a group of sailplane pilots. It seemed appropriate; they were planning a national soaring contest—in Texas.

From *Pandora's Bauxite: The Best of Bates, Selections from The Geologic Column 1966-1985*, by Robert C. Bates.
Submitted by Charles Rivella with permission from the American Geological Institute.

Letter to the Editor

December 7, 2016

To The HGS Editor:

It is our opinion, that the ammonite pictured on the cover of the December 2016 issue of the HGS *Bulletin* is not an *Allocrioceras hazzardi*. *Allocrioceras hazzardi* is a unique helically open-coiled heteromorphic ammonite characterized by a now calcite-filled phragmocone and a distinctive rib sequence with (usually) every third rib being raised or more prominent. Between the raised ribs on the phragmocone are two secondary (more subdued) ribs. In addition, the raised/more prominent ribs have spines that project outward and vary in length in length from 2 to 7mm. The exact purpose/function of the spines has not yet been resolved. All specimens are distinctly discoidal in appearance with often only the phragmocone being preserved. In a few instances, *Allocrioceras hazzardi* specimens with a living chamber have been collected (see photo). Predators would obviously be more interested in the living chamber as compared to the gas-filled phragmocone. Data collected on over 100 specimens suggest that the length ratio of the phragmocone to living chamber was close to 1:1 in adult specimens. Numerous examples of *Allocrioceras hazzardi* are archived at the Non-Verterbrate Paleontology Lab, Jackson School of Geosciences, J.J. Pickle Research Campus, The University of Texas at Austin, Ann Molineux, Curator/Collections Manager. This unique ammonite has only been found in a distinctive ~1.3m thick stratigraphic interval in the Boquillas Formation that also defines the contact between the Ernst and San Vicente members in the Big Bend Region of Texas.

Without knowing where the specimen pictured on the December 2016 cover was found and photographed, it is a planispiral coiled ammonite and probably is a Forresteria species.

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Dee Ann Cooper
(deeanncooper@yahoo.com)
TX PG License #3328

Select References:

Cooper, R.W. and Cooper, D.A., 2014. Field Guide to Late Cretaceous Geology of the Big Bend Region, Texas: Texas Bureau of Economic Geology and Houston Geological Society, 94 p.

Cooper, R.W. (Coordinator), 2011. Geologic Maps of Upper Cretaceous and Tertiary Strata, Big Bend National Park, Texas: Texas Bureau of Economic Geology, Miscellaneous Map Series No. 0050, five (5) geologic quadrangle maps (1:24,000) and 1 sheet of cross sections.

Cooper, R.W. et al., 2005. Proposed: Revise the Contact between Ernst and San Vicente Members, Boquillas Formation, Big Bend National Park, Trans-Pecos, Texas. Geological Society of America, Abstracts with Programs, 37(3), 6.

Cooper, D. A. O. R. 2000. The Allocrioceras hazzaradi Zone in the Boquillas Formation of the Big Bend Region, Trans-Pecos, Texas. Unpublished M.S. thesis, University of Louisiana-Lafayette, 72p.

HGS Applied Geoscience Mudrocks Conference Provides a Low-Cost, High-Quality Training and Networking Opportunity

by Mike Effler and Frank Walles

Please consider attending the upcoming Houston Geological Society 2017 Applied Geoscience Conference titled: "Integrated Approaches to Unconventional Reservoir Assessment and Optimization" scheduled to be held on March 7th and 8th, 2017 at the Anadarko Petroleum Conference Center in The Woodlands, Texas. As a service to advance your personal knowledge in this very important field, this two-day local event will feature the latest on reservoir characterization and optimization of recovery for unconventional reservoirs. A special addition will be a featured speaker, Jeremy Boak, Director of the Oklahoma Geological Survey, who will give a keynote luncheon presentation regarding the Quake Hazards in Oklahoma and their origin. An evening social event will provide opportunities for networking as well as provide time for follow-up discussions with speakers and fellow participants.

Speakers are recognized experts from industry, government, and university who have been specifically selected by our HGS conference organizing committee. The committee-organized technical program will include 20 expert, oral presenters organized within 8 sessions, 15 university research poster presentations, and cores on display from the Wolfcamp and Utica formations (both with presenters).

This is an annual HGS event that was first developed in 2006, at the advent of the combined industry, government, and university early mudrock reservoir characterization research. This conference has established itself as the premier Houston Mudrocks Technical Reservoir Characterization Conference that includes research and applied geology spectrum from the outcrop to the nanoscale. Invited presenters have included the top researchers and experts from the early applied research in the 50s through the present.

This year's technical oral program event includes 16 session Co-Chairs that have developed invited presenter sessions on:

- Diagenetic Components of Mudrocks and Their Impact on Production
- Nanoscale Intra-Kerogen Porosity and Hydrocarbon Phase Producibility/Wettability
- Predicting Petrophysical Flow Properties Using Digital Rock Physics
- Geophysical Methods for Producibility, Fracability and GeoHazards
- Hybrid Unconventional Opportunities
- Tight/Complex Reservoirs Opportunities
- Geo-engineered Completions/Geomechanics
- Operator Cases of Integrated Applied Geoscience for Fun and Profit

As a local Houston Geological Society event, it has proven to be highly cost-effective training for both geoscientists and engineers. The multi-member HGS organizing committee has contributed to making this conference happen for the past eleven years, in part because it would be cost and competitor prohibitive for one single company to organize such a diverse event.

Conference attendees will receive the committee and author-developed expanded abstract/paper technical brochure of the oral and poster presentations to assist in the communication and sharing of the learnings. The HGS provides this industry event to share knowledge of advancing applied geoscience technologies within mudrock reservoir characterization.

This annual Applied Geoscience Conference (AGC) event is a combined education and scientific advancement service for the HGS member community and continues to be generously supported by many industry sponsors. The event location (within conference facilities of Anadarko Petroleum) is a very special tribute from our sponsors and we are especially grateful for the generosity of Anadarko to host this event. Houston Geological Society AGC technical program committee member, Wayne Camp, was especially important in arranging this venue opportunity.

This AGC on mudrock reservoir characterization and optimization has been highly popular since inception with demand frequently exceeding venue capacity. Attendee disciplines include the full range of management through geological, geophysical, petrophysical, production, reservoir and completion engineering. This year, in response to the continued industry downturn, and with the help of our venue sponsor, HGS is again offering this conference at a substantially reduced cost to make it as affordable as possible. If you are interested in attending, but are encountering financial hardships such as unemployment, please contact the HGS office for further reduced pricing consideration. See www.hgs.org or contact Andrea Peoples at (713) 463-9476.

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93% Rated the overall quality of the technical presentations as good or exceptional compared to other industry conferences

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Recognition in Conference Announcements and Website (logo with hyperlink)	✓	✓	✓	✓	✓

91% Rated the talks as applicable to their every day work

Mail Sponsor Request to:
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Applied Geoscience Conference

March 7 - 8, 2017

Integrated Approaches of Unconventional Reservoir Assessment and Optimization

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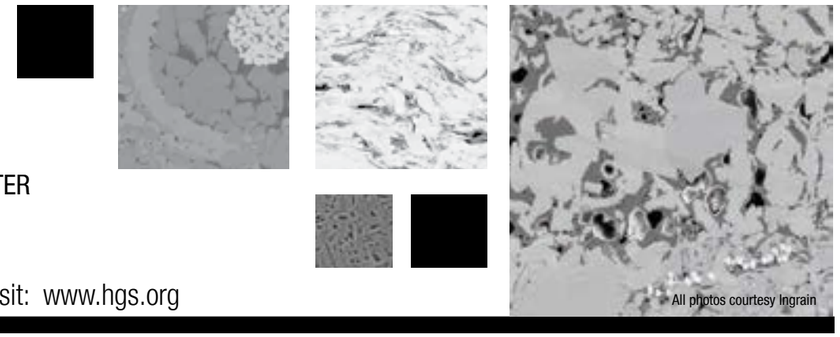

All photos courtesy Ingrain

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For more information please visit: www.hgs.org

Applied Geoscience Conference

March 7 - 8, 2017

Technical Agenda - Tuesday, March 7th

MORNING SESSIONS

7:00 - 8:00 Registration and Coffee

8:00 - 8:10 Welcome and Opening Remarks

SESSION 1: Diagenetic Components of Mudrocks and Their Impact on Production
Chairs: Tina Calvin & Neil Fishman

8:10 - 8:45 Role of Diagenesis in Mudrock Evolution
Neil Fishman, Hess

8:45 - 9:20 Significance of Volcanic Ash in Mudrock Evolution
Christina Calvin, Consultant

9:20 - 9:55 Revealing the Reservoir with DNA Diagnostics
Ajay Kshatriya, Biota

9:55 - 10:20 Coffee Break

SESSION 2: Nanoscale Intra-Kerogen Porosity and Hydrocarbon Phase Producibility / Wettability
Chairs: Avrami Grader & James Macquaker

10:20 - 10:55 What Are We Doing About EOR in Shale and Tight Formations?
Dr. James Sheng, Texas Tech PE Lead of DOE Consortium - Unconventionals

10:55 - 11:30 Quantifying Organic Porosity and Predicting Estimated Ultimate Recovery (EUR)
TBD

11:30 - 12:35 Lunch Break

12:00 - 12:35 **Key Note Talk** - Earthquakes in Oklahoma: Trends in Injection Induced Seismicity and Regulatory Responses
Jeremy Boak, Director, Oklahoma Geological Survey

AFTERNOON SESSIONS

SESSION 3: Predicting Petrophysical Flow Properties Using Digital Rock Physics
Chairs: Taras Bryndzia & Timothy Diggs

12:35 - 1:10 Insights Into Segmentation and Related Problems of Predicting 3D Properties from 2D Images
Nishank Saxena, Shell

1:10 - 1:45 Upscaling in Numerical Simulation of Shale Transport Properties by Coupling Molecular Dynamics Simulation with Lattice Bolzmann Method
Yang Ning, University of Houston Chemical and Biochemical Engineering Dept, PhD Candidate

1:45 - 2:20 Applying Digital Rock Characterization to a New Anadarko Basin Shale Play
Bryan Guzman, Ingrain

2:20 - 2:45 Coffee Break

SESSION 4: Geophysical Methods for Producibility, Fracability and GeoHazards
Chairs: Thomas Reed & Lisa Neelen

2:45 - 3:20 Identifying Re-Stimulation Effectiveness Using Microseismic Attributes
Adam Baig, ESG Canada Inc.

3:20 - 3:55 Exploiting Microseismic Event Characterization to Optimize Completion Strategies
Jamie Rich, Devon

Applied Geoscience Conference

March 7 - 8, 2017

Technical Agenda - Wednesday, March 8th

MORNING SESSIONS

7:00 - 8:00 Registration and Coffee

8:00 - 8:10 Welcome and Opening Remarks

SESSION 5: Hybrid Unconventional Opportunities
Chairs: Obie Djordjevic & Barbara Hill

8:10 - 8:45 Developing a High-Resolution Understanding of Variations in Sedimentological and Petrophysical Property Space in a Thinly-Bedded Reservoir: Improving Predictions Through Cross-Disciplinary Collaboration and Data Integration
Steph Perry and Dawn Hayes, Anadarko

8:45 - 9:20 Enhancing Performance of a Wolfberrry Play via Comprehensive Integrated Petrophysical Analysis
Tim McGinley, Laredo Petroleum

9:20 - 9:55 Dynamic Flow Behavior Using Shale Rock Model for Recovery Analysis
Richard MacDonald, EP Energy; Steve Geetan, EP; and Denis Klemin, SLB

9:55 - 10:25 Coffee Break

SESSION 6: Tight / Complex Reservoir Opportunities
Chairs: Mark Andreason & Matt Williams

10:25 - 11:00 Tight Oil Reservoirs of the Bone Spring Sands - An Example of Low Resistivity Low Contrast Pay
Randy Miller, Core Lab

11:00 - 11:35 Sweet Spot Identification in the Western Anadarko Basin
Jacob Shumway and Brenden Curran, FourPoint Energy

11:35 - 1:00 Lunch Break

AFTERNOON SESSIONS

SESSION 7: Geo-Engineered Completions
Chairs: Randy Lafollette & Luis Baez

1:00 - 1:35 Appraising & Developing Your Mudrocks: How to Avoid Squandering Billions of Dollars Next Time
Cretis Jenkins, Mark McLane, Rose & Associates

1:35 - 2:10 TBD
George King & Co-Author, Apache

2:10 - 2:45 Completion Optimization Using Both Vertical and Horizontal Measurements, an Eagle Ford Shale Case Study
William (Bill) Kreimeier, Lonestar Resources; Maraden Panjaitan, Kevin Fisher, Raj Malpani, Jian Xu, Danny McMillan; Schlumberger

2:45 - 3:15 Coffee Break

SESSION 8: Operator Cases of Integrated Applied Geoscience for Fun and Profit
Chairs: John Breyer & Raj Malpani

3:15 - 3:50 Advanced Core Analysis Methodologies Quantify and Characterize Prolific Liquid Hydrocarbon Quantities in the Vaca Muerta Shale
R. D. Williams, D. M. Willberg, D. Handwerger and D. Ekart, Schlumberger; J. Petriello; R. Suarez-Rivera, Von Gonten Labs

3:50 - 4:20 Utilizing Integrated Fracture Characterization Workflows to Optimize Eagle Ford Development Strategies
Roy Wilty, A.J. Herrs, Lance Wilson, Adriana Fernandez, and Nabiel Eldam, Marathon

Applied Geoscience Conference

March 7 - 8, 2017

University Poster Presentations

UNIVERSITY	NAME	POSTER TOPIC
University of Louisiana at Lafayette	Logan Adams	New Plays in an Old Field: Depositional History and Source Rock Characterization at Teapot Dome, Wyoming
University of Houston	Anna Krylova	Dispersive Properties of a Fractured Fluid-Saturated Layer
Colorado State University	Marisa Boraas-Connors	Identifying Causes of Disturbances to the Re-Os Geochronometer in Black Shales: An Example from the Late Jurassic Agardhfjellet Formation, Svalbard
Oklahoma State University	Ibukun Bode	NMR Characterization and Pore-scale Imaging in Mississippian-aged Carbonate Mudrocks of the Southern Midcontinent
Oklahoma State University	Justin Steinmann	Assessing Sulfur Isotopes as a Potential Correlation Tool in Carbonate Mudrocks of the Mississippian Limestone
Texas Tech	Eric Friedman	Preliminary Results: Comparing Siliciclastic Content of Ramp to Rimmed Carbonate Slope Deposits During Relative Sea Level Highstands
Southern Illinois University	John Ejembi	Utilizing Multi-geochemical Proxies in Paleosols to Investigate the Shift in Middle Jurassic Depositional Environment in Western Colorado
University of Houston	Zohreh Souri	TOC Estimation of the Marcellus Shale, Bradford County, Pennsylvania
University of Houston	Ane Slabic	Uranium, Thorium, and Lead Isotope Geochemistry of Petroleum Source Rocks: An Example from the Eagle Ford Group, Texas
Texas A & M Univerisity	Han Li	Hydraulic Fracture Height Predictions in Laminated Shale Formations Using Finite-Discrete Element Method
Cornell University	Jonathan (Casey) Root	Diagenetic Evolution of the Cherry Valley Member of the Oatka Creek Formation, Marcellus Subgroup, New York
University of Oklahoma	Alex M Vachaparampil	The Influence of the Intermediate Principal Stress on the Strength of the Mancos Shale
New Mexico Tech	Natasha Trujillo	Influence of Lithology and Diagenesis on Mechanical and Sealing Properties of the Thirteen Finger Limestone and Upper Morrow Shale, Farnsworth Unit, Texas
University of British Columbia	Pablo Lacerda Silva	Contrasting Reservoir Facies of the Doig Formation, Western Canada Sedimentary Basin: Insights from Pore-size Distribution, Mineralogy and Organic Geochemistry
University of Texas of Permian Basin	Joanna Walker	The Impact of Post Oil Emplacement Tectonics of the Delaware Mountain Group, with an Emphasis on Residual Oil Zone Potential

Posters will be on display throughout the conference.

Wednesday, February 8, 2017

Black Lab Pub, Churchill Room • 4100 Montrose Blvd.
Social Hour 5:30–6:30 p.m.
Dinner 6:30–7:30 p.m.

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

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Laurie Long
Aspen Insurance

ETHICS MOMENT

We will dedicate 15 minutes at the beginning of each meeting to ethics to apply towards 0.25 hours of ethics credit.

Environmental Risk and Management Through Insurance

Risk is present in every facet of everyday life, and there are risks that companies decide to retain; oftentimes that risk is associated with environmental exposure. Environmental risks are often underestimated and companies may feel that their particular environmental risk is manageable. The problem with environmental risk is that it is predominantly a severity issue and not a frequency issue. That severity factor could devastate a company that is unprepared for the potential financial exposure. When a company determines that they either do not want or cannot take a chance on absorbing that financial exposure, they may opt to transfer that risk. One risk transfer method that is infrequently explored is environmental insurance. In this presentation, we will explore the basic types of environmental insurance available in the marketplace, and discuss the available basic insurance coverages, and also discuss various claims scenarios.

Biographical Sketch

Laurie Long is an Assistant Vice President with Aspen Insurance, a global property, casualty, professional and management liability insurance company (NYSE: AHL). Ms. Long performs environmental insurance underwriting for a wide variety of products. She has over 30 years of experience in the environmental field including consulting and hazardous waste industry. Prior to joining Aspen, Ms. Long performed underwriting and loss control evaluation for AIG. She has a BS in Zoology and an MS in Natural Science and holds a Texas PG and a Certified Insurance Counselor's designation.

Monday, February 13, 2017
Westchase Hilton • 9999 Westheimer
Social Hour 5:30–6:30 p.m.
Dinner 6:30–7:30 p.m.

Cost: $45 Preregistered members; $50 non-members/walk-ups

To guarantee a seat, pre-register on the HGS website & pre-pay by credit card.
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Paul Britt
AAPG President
Amy Atwater and Eileah Sims
Big Bend Paleontology Fellowship Awardees

Scholarship Night

Please join us on this evening to recognize HGS Scholarship Winners over the current fiscal year. We will also recognize Amy Atwater and Eileah Sims who recently completed Paleontology Fellowships at Big Bend National Park that were sponsored by HGS.

AAPG's Support for Students: Future Impacts Start Today

By Paul Britt

The American Association of Petroleum Geologists (AAPG) is a great supporter of geoscience students around the world, largely through funding provided by the AAPG Foundation. That support comprises programs and students at all educational levels – from high schools (through the Foundation's Teacher-of-the-Year initiative), to undergraduate college programs, to graduate geoscience students. The support is institutional and administrative – AAPG Student Chapters can be found around the world, and those same students are provided with incredible educational and networking opportunities through student expos, the Visiting Geoscientist Program, and the celebrated Distinguished Lecture program. The support also is financial – in fact, four of the Foundation's seven funding priorities deal directly with geoscience students and educational programs. Of course, AAPG's connection with students starts with an obvious first step: Membership in the Association, which is free of charge through AAPG's Corporate Sponsorship Program, sponsored exclusively by Chevron. And that's just the start.

The American Association of Petroleum Geologists (AAPG) is a great supporter of geoscience students around the world, largely through funding provided by the AAPG Foundation.

Imperial Barrel Award Program

AAPG's Imperial Barrel Award Program (IBA) is an annual prospective basin evaluation competition for geoscience graduate students from universities around the world. University teams compete to win scholarship funds for their geoscience department and the international recognition that comes from competing or winning in the competition. The program is rigorous and contributes to AAPG's mission of promoting petroleum geoscience training and advancing the careers of geoscience students.

In this global competition, university teams analyze a dataset (geology, geophysics, land, production infrastructure, and other relevant materials) in the eight weeks prior to their local competition. Each team delivers their results in a 25-minute presentation to a panel of industry experts. Students have the chance to use state-of-the-art technology on a real dataset, receive feedback from an industry panel, impress potential employers in the audience, and win cash awards for their school. The judges will select the winning team on the basis of the technical quality, clarity and originality of presentation.

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

Biographical Sketch

Paul Britt is an independent geologist in Houston, having worked as a consultant and an expert in Petra and Kingdom

HGS General Dinner *continued on page 22*

HGS General Dinner *continued from page 21*

workstations for about 89 different clients over the years. He worked for Elf Aquitaine, Union Texas Petroleum, Michigan Wisconsin Pipeline and Exlog before becoming an independent in 1992. He is a graduate of Eastern Michigan University with a BS in Geology, and moved to Houston in 1978.

Paul is a licensed Professional Geoscientist in Texas and Louisiana, and is a Certified Petroleum Geologist (AAPG and SIPES) and current President of the AAPG. He is a HGS Lifetime Honorary Member and has served on the Board of Directors. He is an Honorary Member of the GCAGS. He is a member of the SPWLA. He has served as a SIPES officer on the local and national Boards, and is a Past President of the SIPES Foundation. He is a Past-President of the AAPG Division of Professional Affairs and has also served in the AAPG House of Delegates.

From Only the Eocene to Getting the Whole Scene: My Time as a Paleontology Intern at Big Bend National Park

By Amy Atwater, *University of Texas at Austin Vertebrate Paleontology Laboratory*

Primates, rhinos, and giant snakes are animals that you are most likely to find in a tropical jungle, somewhere near the equator. Fifty million years ago, during the Eocene Epoch, that was not the case. During the late Paleocene and early Eocene, the Earth experienced one of the warmest periods of the Cenozoic, and rainforests covered North America, all the way up to the Arctic. The fossils of the plants and animals that lived in these forests are found throughout the West, and I studied the Eocene mammals of Big Bend National Park (and surrounding West Texas) as a graduate student at the University of Texas at Austin.

I have been fortunate to conduct multiple field seasons in the park, but prior to my internship, I was only exposed to the Hannold Hill and Canoe Formations. My interest in the entire park's geologic history and my career aspirations with the National Park Service made me a great fit for the position as paleontology intern for Big Bend. Working and exploring the park this past summer has truly been the highlight of my time in Texas. I was elated to find dinosaur bones, shark teeth and Deinosuchus osteoderms eroding out of the Aguja Formation while hiking the Chimneys Trail. I found belemnites filled with calcite crystals while exploring in the limestone Boquillas Formation. I hiked to the giant, gorgeous ammonite fossil along the Hot Springs Trail on the morning of my twenty-fifth birthday. Beyond paleontology, I was dazzled by the cooling peaks of the Chisos which I enjoyed from Emory Peak and the South Rim, and the laccoliths eroding in the most beautiful shapes, culminating in the Balanced Rock at the Grapevine Hills Trail.

To say I loved my time as the paleontology intern at Big Bend is an understatement; it was life changing. Writing material for the Fossil Discovery Exhibit website and park newspaper allowed me to share my interpretive and scientific skills, and share science with a broad, diverse audience. I have traveled to many national parks, but I continue to be impressed with the treasures of Big Bend, and the motivation of the park and friends to share its incredible paleontological resources with all visitors. I am so proud to be a part of the Fossil Discovery Exhibit at Big Bend National Park. I hope to inspire other young scientists to find their passion by finding their park, and I would love to one day put on an NPS badge and become the official Paleontologist of Big Bend. I am so thankful for the Houston Geological Society and Big Bend Conservancy for sponsoring and organizing this opportunity.

Biographical Sketch

Amy Atwater is a third-year graduate student studying mammal paleontology at the University of Texas at Austin. Amy grew up in Oregon where she visited many national parks including the John Day Fossil Beds National Monument and Crater Lake National Park. She received her BS in Geology from the University of Oregon Honors College in 2013. In 2010 and 2011, Amy worked as an interpretive park ranger at Arches National Park in southeast Utah. In 2013, Amy worked as a GeoCorps Paleontology/GIS intern at Denali National Park and after the internship, she was hired as a seasonal physical science technician. Amy hopes to work as a paleontologist for the National Park Service, as she loves hiking and exploring parks just as much as she loves science. Amy is passionate about sharing paleontology with wide, diverse audiences and increasing the involvement of underrepresented groups in STEM fields.

My Summer Job: Paleontology Intern at Big Bend National Park

By Eileah Sims, *sims.eileah@gmail.com*

Big Bend National Park has one of the longest and most complete sequences of geologic time in the National Park Service and is the only park with strata exposing the K-Pg boundary. A new fossil exhibit, called the Fossil Discovery Exhibit, was constructed to showcase this amazing fossil resource. Another fellow and I were called upon to help park officials create promotional materials for the new exhibit. We wrote articles for the exhibit's website, as well as some for the park newspaper, *The Paisano*. In addition to writing these articles, we explored the park. We went on many trails including Lost Mine and Grapevine Hills. Park Geologist Don Corrick took us to several fossil localities where I found a *Deinosuchus* (large alligatoroid) tooth and various crocodile scutes as well as hadrosaur (duck-billed dinosaur) bones. This fellowship was a learning experience for me and I am grateful for the opportunity to explore this amazing park.

Biographical Sketch

Eileah Sims graduated from Texas A&M University in College Station in May of 2016 with a Bachelor's degree in geology. She recently completed a fellowship at Big Bend National Park this past summer during which she helped park officials create promotional materials for their new Fossil Discovery Exhibit. She is currently looking for graduate schools to pursue a Masters or PhD in paleontology. She hopes to become a museum curator, a research professor, or a paleontological artist.

Monday, February 20, 2017
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Dinner 6:30–7:30 p.m.

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HGS International Dinner Meeting

Shenelle Gomez
Department of Earth and Atmospheric Sciences, University of Houston

Tectonostratigraphic Evolution of the Barbados Accretionary Prism and its Controls on Hydrocarbon Prospectivity Offshore Barbados

The Barbados accretionary prism (BAP) at the leading edge of the eastward-moving Caribbean plate covers an area of ~10,000 km2 and is the world's largest accretionary prism. The overall shape of the BAP is convex upward with bivergent zones of thrusting on its eastern edge, where oceanic crust of the Atlantic Ocean is subducting to the west beneath the Lesser Antilles volcanic arc, and on its western edge, where the oldest part of the prism is being backthrust to the west over the Tobago forearc basin (TFB). I use an extensive grid of 2D seismic reflection data to define five structural provinces within the Barbados accretionary prism: 1) **zone of initial accretion** characterized by an imbricate system of westward-dipping thrust faults of Paleogene Recent age that root into a basal decollement; 2) **zone of stabilization** characterized by near vertical thrust faults and shale diapirism; 3) **zone of asymmetrical piggyback basins** that included the Barbados basin, formed along eastward-dipping and active thrust faults of Paleocene-Recent age; 4) **Tobago Barbados Ridge (TBR)**, interpreted as an unsubductable allochthonous metamorphic terrane serving as a backstop to prism sediments south of the Demerara fracture zone (DFZ) at ~12.5N. The exact age of the origin for the BAP is not well known but is thought to be late Cretaceous. All of the above structural zones show varying degrees of active deformation.

The deep-water Barbados basin, south of the island of Barbados, is an emerging exploration province, situated less than 130 km to the north of productive oil and gas giant fields offshore and onshore Trinidad and onshore northeastern Venezuela. The hydrocarbon potential of the Barbados basin is supported from oil geochemistry of Barbados oil seeps by the buried presence of a proven world-class Cretaceous source rock, the La Luna Formation. On Barbados, these source rocks charge deep-water, clastic, Eocene-Miocene reservoirs fed by channel systems, turbidites and fans of the Orinoco Delta. The Sandy Lane well, drilled in 2001 in the southern Barbados basin to target the Neogene play, which was inferred to extend from Trinidad into the deeper water, recorded presence of excellent quality clastic successions of ~400-420 ft. thick sand with porosities between 24-28%, and interbedded ~150 ft. thick columns of shales interpreted as potential seals. Seismic interpretation indicates that there are three key seismic facies within the Barbados basin: 1) mass transport complexes, which may serve as effective seals; 2) turbidite flow-induced leveed channel complexes, and; 3) distributary channel complexes identified here as the main reservoir targets. Multiple structural traps exist within the Barbados basin. The requirements for future exploration in this region might include: 1) presence and distribution of Cretaceous marine shales, charge access and migration pathways; 2) preserved traps and multiple extensive seal layers for commercial accumulations; and 3) turbidite flow-induced channel complexes as main reservoir targets. ■

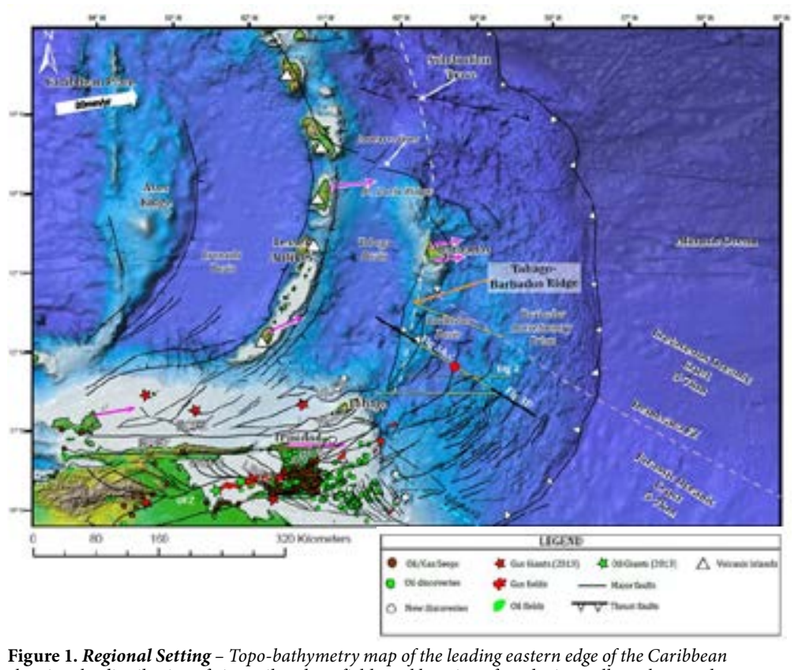

Figure 1. ***Regional Setting*** *– Topo-bathymetry map of the leading eastern edge of the Caribbean showing the distribution of giant oil and gas fields and location of producing wells onshore and offshore Trinidad and northeastern Venezuela, in relation to the relatively under-explored Barbados accretionary prism.*

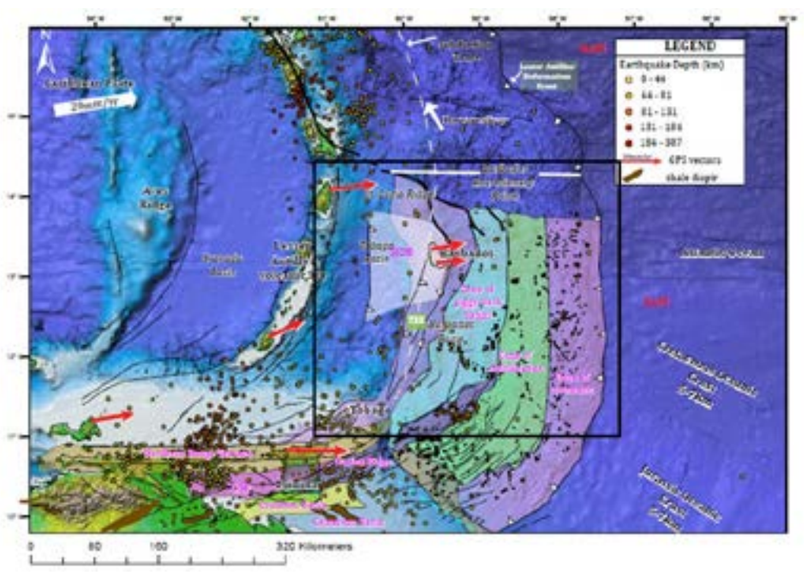

Figure 2. ***Structural Provinces of the BAP*** *– Map of the major tectonic provinces, structure, seismicity and regional trends within the study area.*

Biographical Sketch

Shenelle Gomez earned a BSc in Geology from the University of Houston, and graduated Magna Cum Laude in 2014. She is currently a PhD candidate in geology at the Department of Earth and Atmospheric Sciences and a Graduate research assistant working with the Caribbean Basins, Tectonics and Hydrocarbon (CBTH) project at the University of Houston. Shenelle's dissertation topic is the tectonostratigraphic evolution of the Barbados accretionary prism and its controls on the hydrocarbon potential in the deep water frontier basins of Tobago and Barbados. Shenelle was captain of the 2016 University of Houston's AAPG Imperial Barrel Award (IBA) team that finished second in a field of 12 universities in the AAPG Gulf Coast regional competition. She placed second in the 2016 AAPG student poster session held in Canada in summer of 2016, where she presented a play-based assessment of the Barbados Basin.

HGS International Dinner Meeting

Applied Geoscience Conference

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November 8-9, 2017

Geomechanics in Unconventionals

Please join us for the Houston Geological Society's premier one day technical conference, focusing on geomechanical integration and advancement in the assessment of unconventional reservoirs.

The program will highlight field examples of geomechanical workflows, with sessions focusing on Unconventional Geology & Geophysics, and Integrated Workflows & Engineering Design.

Wednesday AM	Session 1	- Geomechanical Characterization
Wednesday PM	Session 2	- Engineering Applications
Thursday AM	Session 3	- Surveillance and Diagnostics
Thursday PM	Session 4	- Case Studies

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Complimentary Vendor Booth	✔	✔	✔	
Recognition in Program Book, onsite signage, HGS Bulletin	✔	✔	✔	✔
Recognition in conference announcements and website with logo hyperlink	✔	✔	✔	✔
*Booths/Posters	Assigned on first come, first serve basis with confirmation of payment			

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devon

For more information please visit: www.hgs.org or contact Andrea Peoples: andrea@hgs.org

Wednesday, February 22, 2017

Petroleum Club of Houston • 1201 Louisiana (Total Building)
Social 11:15 a.m., Luncheon 11:30 a.m.

Cost: $45 Preregistered members; $50 non-members/walk-ups

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Grey Areas: Interactive Application of Business Ethics in the Geoscience Profession

John E Jordan, Jr.
HGS President

Most large oil companies require their employees to have yearly ethics training which is often broad and dry. Texas Board of Petroleum Geologists (TBPG) licensees are also required to have one hour of ethics training every year; this talk will fulfill that requirement for 2017. Although I do not have a degree in philosophy or jurisprudence, I have been an international explorationist for 35 years and am aware of many situations where individual or business ethics were tested. Last year's lecture introduced the theory of philosophical ethics and explored the difference between moral compass and ethics and how this relates to business ethics.

This year we will review this model and then apply it to our industry with *LIVE* feedback from the audience via polling technology. *Please submit ethics examples you have encountered in your career to the HGS office by February 17th to be considered for use in the lecture.* Examples will be anonymous as we discuss how to use the Business Ethics Model to make sound, consistent, ethical decisions and get immediate audience feedback. Come and join in an entertaining and spirited discussion about the "grey areas" and make sure to bring a phone that is capable of texting or a smart phone that has web access. Education certificates will be provided. ■

Biographical Sketch

John E Jordan, Jr. is the current President of the HGS and a licensed geoscientist in Texas. He is a retired Project Geophysical Advisor who has worked for several Fortune 500 oil companies in California and Texas. Prior to joining Anadarko in 2007, he worked at Kerr McGee, Noble Energy, Arco and Chevron. During 30+ years in the oil industry, he has worked deep-water projects from Alaska and the Gulf of Mexico to the Middle East, Asia, Africa and South America. John is a graduate of Wright State University where he received both a BSc and an MSc from the College of Science and Mathematics majoring in geology and geophysics. He does not hold degrees in philosophy or jurisprudence but enjoys lively debate on most any subject.

Interested in bringing advanced technology, new geologic discoveries, and career pathways for your students into the classroom?

Register Now!

The American Association of Petroleum Geologists invites middle-school, high-school, and community college educators to help celebrate its 100th anniversary!

Earth Science Educator Program, April 1-4, 2017

Geologic Field Trips (*Saturday, April 1*)

Spend a day in the field with geoscientists to investigate local geology. Channel your inner scientist: make observations, apply field methods, analyze data, and interpret findings.

Symposium (*Sunday, April 2*)

Join colleagues for a day of interactive sessions exploring emerging fields, advances in technology, and careers. Discussions will highlight data, resources, and ways to bring content into the classroom. Topics include:

- **Roving Robots and Extreme Machines, New Frontiers of Earth Exploration**
- **Careers: A Path for Students to a Geosciences Paycheck**
- **Seeking Oil and Gas in 2017 and Beyond**
- **Why Seismic Matters in Our Hunt for Resources**
- **A Changing World for Petroleum**

Participate in the Convention (*Monday and Tuesday, April 3 and 4*)

Explore exhibits and see the latest in petroleum industry information and technology. Pair up with an industry professional. Interact with representatives from industry, organizations, and universities. View posters and attend technical presentations on cutting-edge industry topics for professional audiences. And more!

Details: http://ace.aapg.org/2017/networking-and-events/aapg-earth-science-educator-program

Registration: https://fs3.formsite.com/AAPGevents/form91/index.html?1481578663623

Participants will receive Gifted and Talented and Professional Development credit hours.

Complimentary event registrations and daily stipend are available for a limited number of participants.

Questions?
Contact stephanie.shipp.1@gmail.com or amanda.guzofski@chevron.com.

Thursday, February 23, 2017

Southwestern Energy Conference Center, 10000 Energy Drive, Spring, TX 77389
Social 11:15 a.m., Luncheon 11:30 a.m.

Cost: Active/Associate Members - $30, Emeritus/Life/Honorary - $25
Students who are members of HGS - $10, Non-members - $40

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.

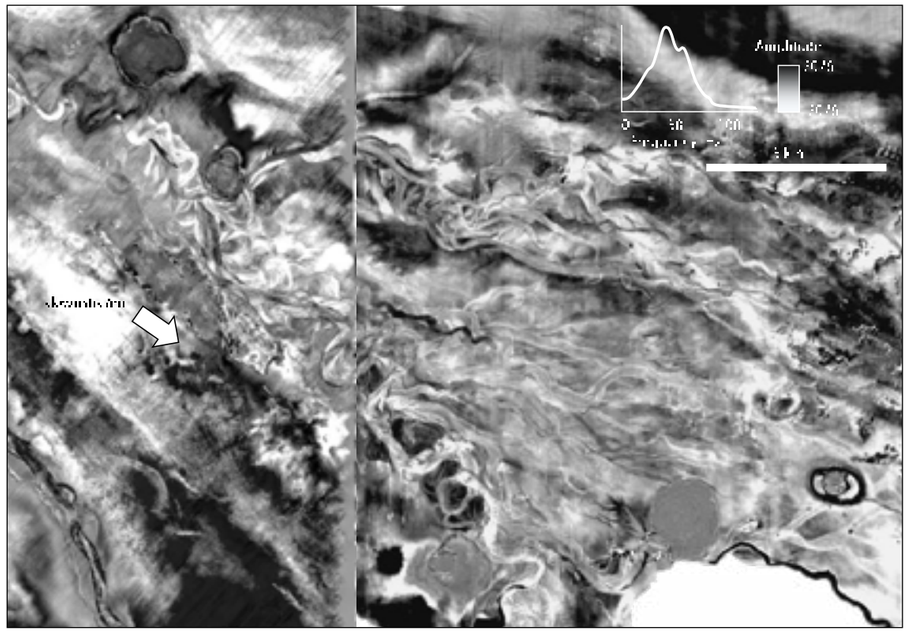
If you are an Active or Associate Member who is unemployed and would like to attend this meeting, please call the HGS office for a discounted registration cost. We are also seeking members to volunteer at the registration desk for this and other events.

Jacob Covault
BEG, The University of Texas at Austin

Predictive Organization of Intra-Slope Basin Submarine Fans

The connectivity and facies heterogeneity of submarine fans are important uncertainties in reservoir characterization and development. The distal, basin-floor deposits of submarine fans have been interpreted as laterally extensive, sheet-like deposits. However, recent work has shown more complex three-dimensional architecture and spatial variability of petrophysical properties, which can have significant impact on reservoir performance. We use three-dimensional seismic-reflection data (~35 Hz dominant frequency) in the subsurface offshore Trinidad (blocks 25A and 26) to document the stratigraphic architecture of an intra-slope basin submarine-fan system characterized by sinuous leveed channels feeding the channel-lobe transition zone and depositional lobes. Leveed channels avoid mass-transport complexes and mud volcanoes as they traverse a steep (>0.5 degrees) reach of the continental slope. Channels transition to a field of 10^2-10^3 m wavelength and 10 m wave height scours at a slope break (~0.25 degrees). Some of the scours are aligned in linear trains and resemble erosional features of the channel-lobe transition zone documented with higher-resolution acoustic imaging of the seafloor and shallow subsurface globally. Stratigraphically overlying the channel-lobe transition zone, scours coalesce to form low-relief (~10-20 m), compensationally stacked channels. At the mouth of each channel are scours that transition to a depositional lobe (several km long). The stratigraphic architecture of the intra-slope

HGS Northsiders Luncheon *continued on page 31*



Horizon slice top intra-slope basin submarine fan, offshore Trinidad

HGS Northsiders Luncheon

continued from page 29

basin submarine-fan system, comprising channel-fill and lobe architectural elements, reflects repeated cycles of channel avulsion, compensation and modification of initial deposits, and unconfined deposition at the channel mouth. Furthermore, we expect that the preservation of the channel-lobe transition zone and its scours are important considerations in reservoir characterization in other tectonically active continental margins with rapid aggradation of a submarine-fan system. In these settings, high gradients and sediment supply can promote local intraslope coarse-grained turbidite deposition at slope breaks where hydraulic jumps in overriding turbidity currents govern the facies architecture and evolution of submarine fans. We place our interpretations within an architectural hierarchy and consider the impact of depositional heterogeneity on fluid flow behavior during hydrocarbon production. These interpretations inform the modeling and prediction of 3D heterogeneity of intra-slope basin submarine-fan systems and illustrate the importance of detailed characterization in order to understand reservoir connectivity and quality. ■

Biographical Sketch

Dr. Jacob Covault is a Research Scientist and leader of the Quantitative Clastics Laboratory (QCL). His expertise is the sedimentology and stratigraphy of deep-water depositional systems, and source-to-sink sediment dispersal. Jacob aims to address challenges in the exploration and development of natural resources, namely reservoir presence and quality prediction in frontier basins, and reservoir connectivity and heterogeneity. Prior to his present position at the QCL, Jacob was a senior research scientist at Chevron Energy Technology Company, and served the Department of the Interior at the U.S. Geological Survey. He received PhD and BS degrees in Geological and Environmental Sciences at Stanford University, where he played football 1999-2003. Jacob has published peer-reviewed research papers and scientific conference abstracts pertaining to petroleum geology, reservoir characterization, sedimentology, stratigraphy, basin analysis, Earth surface processes, and marine geology. Jacob was just announced as the recipient of the 2017 SEPM Wilson Award in recognition of "Excellence in Sedimentary Geology by a Young Scientist."

Monday, February 27, 2017
Westchase Hilton • 9999 Westheimer
Social Hour 5:30–6:30 p.m.
Dinner 6:30–7:30 p.m.

Cost: $45 Preregistered members; $50 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.

If you are an Active or Associate Member who is unemployed and would like to attend this meeting, please call the HGS office for a discounted registration cost. We are also seeking members to volunteer at the registration desk for this and other events.

Leon Thomsen
Chief Scientist of Delta Geophysics

Life of Field: Geoscience Monitoring of Reservoir Performance

SEAM is the research arm of the Society of Exploration Geophysicists (SEG). It puts together industrial collaborations to accomplish industrial-scale, realistic, numerical simulations. The latest three-year project is "SEAM LoF: Integrated Geoscience for 4D Numerical Modeling". The pilot project modeled a Gulf of Mexico turbidite fan sequence that is folded and faulted. The geological component included a fully-coupled 4-dimensional specification of reservoir geometry, lithology, porosity, saturation, permeability, and geomechanical deformation, all on a 1-meter scale. A realistic production plan simulation operated for 24 months (7 producers and 7 injectors), with seismic simulations before and afterward. The results seem to be plausible, sometimes after some contemplation and discussion.

In the next two years, project participants will refine and extend this model, and build and compute new models. Two years after the end of the project, non-participants will gain access to all numerical results. ■

Biographical Sketch

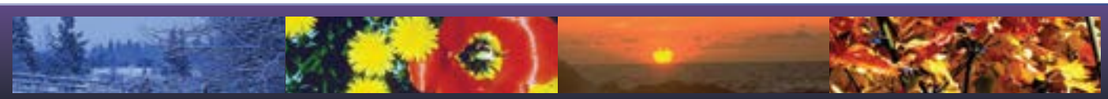
Leon Thomsen holds degrees in geophysics from Caltech (BS, 1964) and Columbia (PhD, 1969). His academic career began with postdoctoral appointments at CNRS in Paris and at Caltech followed by tenured faculty appointments at the State University of New York at Binghamton (1972-80). Thomsen's industrial career began in 1980 at Amoco's famous Tulsa Research Center. In 1995, he moved to Amoco's Worldwide Exploration Group in Houston, to help implement the ideas that he had earlier helped to invent. Following the 1999 merger, he served in BP's Exploration and Production Technology Group in Houston as Principal Geophysicist and Senior Advisor. Following retirement from BP in 2008, he remains professionally and scientifically active as Chief Scientist of Delta Geophysics (hhtp://DeltaGeophysics.net), as Research Professor at the University of Houston, and as visiting Scientist a Lawrence Berkeley National Laboratory. Thomsen has led technical development in applied geophysics through innovation in vector seismics (polar anisotropy, azimuthal anisotropy, azimuthal AVO, converted-waves, and Life-of-Field-Seismics); in pore-pressure prediction; and most recently in controlled-source electromagnetic (CSEM) and fluid dependence of seismic response, through numerous SEG publications and presentations, and many patents. Thomsen was an early recipient (1960-64) of an SEG Scholarship. He received SEG's Fessenden Award in 1994. He served as SEG Distinguished Lecturer in 1997 and as SEG/EAGE Distinguished Instructor in 2002. He is an Honorary Member of GSH and of EAGE. He was appointed a foreign member of the Russian Academy of Natural Sciences, and given their Kapitsa Medal in 2004. He served SEG as Vice President, as President-Elect, and as President (2006-2007).

HGS Tennis Tournament

Dear Geoscientist,
Houston Geological Society is organizing a tennis tournament for its members and colleagues in the industry as a fun and active networking event during late Spring 2017. At this time we are looking for volunteers to help set up and run the event: find sponsors and vendors, decide on tennis facility, etc. Knowing the sport of tennis is a helpful but not mandatory for the tasks at hand.

Interested parties should contact Constantin Platon at platonpc@gmail.com **for more details and how to get involved. Thank you!**

February 2017



GeoEvents

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3 **Don't wait, make your reservations online at hgs.org**	4
5	6	7 **HGS Board Meeting** *6 p.m.*	8 **HGS Environmental & Engineering Dinner Meeting** *"Environmental Risk and Management Through Insurance," Laurie Long* *Page 19*	9	10	11
12	13 **HGS General Dinner Meeting** *Scholarship Night* *"AAPG's Support for Students: Future Impacts Start Today," Paul Britt* *Page 21*	14	15 **April 2017 Bulletin** CONTENT DUE	16	17	18
19	20 **HGS International Dinner Meeting** *"Tectonostratigraphic Evolution of the Barbados Accretionary Prism and its Controls on Hydrocarbon Prospectivity Offshore Barbados," Shenelle Gomez,* *Page 24*	21	22 **HGS General Luncheon Meeting** *"Grey Areas: Interactive Application of Business Ethics in the Geoscience Profession," John Jordan* *Page 27*	23 **HGS Northsiders Luncheon Meeting** *"Predictive Organization of Intra-Slope Basin Submarine Fans," Jacob Covault* *Page 29*	24	25
26	27 **HGS North American Dinner Meeting** *"Life of Field: Geoscience Monitoring of Reservoir Performance," Leon Thomsen,* *Page 33*	28				

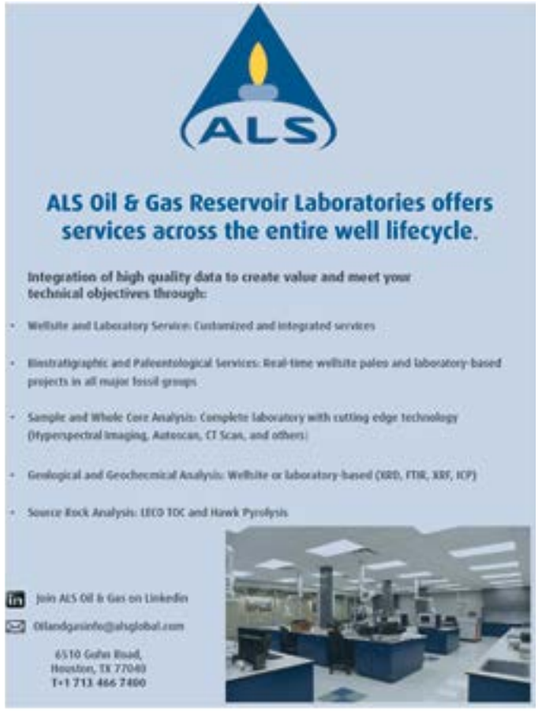
Reservations:

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 office@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.**

Members Pre-registered Prices:

Dinner Meetings members	$45
Emeritus/Honorary members	$40
Student members	$10
Nonmembers & walk-ups	$50
Except - Env. & Eng.	$30
Nonmembers & walk-ups	$35
Emeritus/Honorary members	$15

February 14-16, 2017
GSH Luncheon: Data Interpretation and Integration from a Seismic Perspective
Petroleum Club of Houston
February 15-17, 2017
NAPE Summit
George R. Brown Convention Center Houston, TX
February 22, 2017
AAPG Playmaker's Forum
Midland, TX
February 28,- March 3, 2017
GSH & SEG Live Webinar
Interesting Topics in Land Sesimic Data Acquisition, Processing and Inversion, 10am-2pm
March 7-8, 2017
HGS Applied Geoscience Conference
April 2-5, 2017
AAPG – ACE Annual Convention & Exhibition
Houston, TX
April 21, 2017
HGS Shrimp Peel & Crawfish Boil
Bear Creek Park, Houston, Texas
April 26-28, 2017
Seapex Exploration Conference
Singapore, Asia
April 28-30, 2017
AAPG Hedberg Conference
Beijing, China
Spring 2017
HGS Tennis Tournament
August 18-22, 2017
AAPG Geosciences Technology Workshop
Astrogeology Total Solar Eclipse Field Seminar, Casper, WY
November 8-9, 2017
HGS Applied Geoscience Conference
Geomechanics in Unconventionals



What's Happening in the Houston ISD High School Pipeline? How is HGS Helping?

*By **Letha Slagle,** co-chair of the Educational Outreach Committee*

Four Houston ISD Petroleum Academy magnets provide rigorous academic and professional experiences for students dedicated to pursuing careers in engineering and geoscience. These are broadly located across Houston at Westside High School, Milby High School, Young Women's College Preparatory Academy and the Energy Institute, to reach a highly diverse student body. The academies were pioneered by the Independent Petroleum Association of America (IPAA) Energy Education Center, and later joined by Petroleum Equipment and Services Association (PESA), which have developed linkages with industry partners including Shell, Apache, Marathon, Halliburton, Core Labs, Newfield, Oceaneering, FMC Technologies, Schlumberger and others. Together, they sponsor visits to labs and museums, culminating in a paid short summer externship at a corporate partner prior to senior year. These externships provide defining moments in preparation for college and career…helping students decide on a direction and differentiate themselves in college applications. Indeed, some students ultimately have post college professional employment offers from the same companies for which they externed.

It has been difficult to sustain the geosciences within the program, due to lack of AP level earth science course-work at the schools. Here is where we at HGS have stepped in. Over a period of five years, we have built up a varied repertoire of contributions. Initially, we provided individualized interview skills training to the students and trained-the-trainers at the IPAA Energy Education Center. These interviews are part of the professional learning experience leading up to the summer externship. Recently, we have focused more on the technical geosciences content. We have held multiple Geologic Map Labs, Rock Labs, and Career days at all of the schools. We introduced guided geologic field trips to various sites, including the Texas Hill Country, Whiskey Bridge and High Island. For these, we have produced narrated video presentations, worksheets and provided on-site geologic personnel. Our modus operandi is to work in partnership with IPAA, which provides the contacts at the schools, organization, transportation and responsibility for the students, while we of HGS design and deliver the educational materials, volunteer geologic instructors and learning event to the students.

Highlights of the fall semester 2016 included three main events. For the third consecutive year, we sponsored a day at the Houston Museum of Natural Sciences for approximately 140 first year students. Letha Slagle of HGS and Erik Bartsch, Exploration Manager for the Gulf of Mexico at Shell, gave introductory talks

What's Happening in the HISD High School Pipeline? *continued on page 39*

HGS Shrimp Peel & Crawfish Boil

April 21, 2017
12:00 noon – 6:00pm

Bear Creek Pioneers Park
3535 War Memorial Street, Houston, TX 77084

Boiled Shrimp – Boiled Crawfish
(Corn & Potatoes, Hot Dogs)
Beer & Beverage – Live Music

HGS Member pre-order $30
HGS non-member pre-order $35
Walk ups (if available) $45

Sponsorship Opportunities

Shrimp Sponsor $2000.00 - 4 Complimentary event tickets
Crawfish Sponsor $2000.00 - 4 Complimentary event tickets
Beer & Beverage Sponsor $1000.00 - 2 Complimentary event tickets
Live Music Sponsor $1000.00 - 2 Complimentary event tickets Platinum Corporate Sponsor $1000.00 – 2 Complimentary tickets Gold Corporate Sponsor $750.00
Silver Corporate Sponsor $500.00
Bronze Corporate Sponsor $250.00

To be a Sponsor please call Andrea Peoples at the HGS Office 281-463-9476 or email andrea@hgs.org

What's Happening in the Houston ISD High School Pipeline?

continued from page 37

on careers in geology and showed the U.T. Jackson School of Geology "Earth is Calling" video. Then the students broke into three rotations and attended docent-led tours of the Paleontology Hall, the Gem and Minerals Hall and the Energy Hall touch carts. Finally the students attended the Dark Universe show in the Planetarium. The docents were outstanding, and Janet Combes and Inda Immega of HGS were also integral to helping organize this event.

For the third year students, we held a rock lab at the U. T. Bureau of Economic Geology core lab in Houston. Due to the kind generosity of this facility, which waived the usual fees, we were able to rotate three schools through the event. This is a significant improvement over past years, during which we have hand carried rocks into schools to deliver the information. Students began the day with a short presentation on rocks and minerals, and then had the opportunity to work through exercises at five stations, including a hand sample / hand lens station, three core stations, and a binocular microscope station. The number and caliber of our volunteers significantly increased the quality of the student learning experience. In particular, we would like to recognize Beverly DeJarnett, Debra Balthazar, Chuck Caughey, Steven Johansen and Sharie Sartain for helping educate approximately 100 students with hands-on experience.

The final event of the fall semester was Galveston Island day, again involving three of the Petroleum Academies. IPAA/PESA sponsored the buses and a visit to the Ocean Star Offshore Drilling Rig and Museum. From there, the students took the Bolivar Ferry and met HGS on the beach of High Island. Prior to the day, participating students had seen a narrated video presentation produced by Letha Slagle to familiarize themselves with the geology and exercises at the beach. The learning points included sandstone facies and reservoir quality, barrier island depositional processes, and salt deposition, structural and trapping processes. Activities included trenching, sieving, hand lens use on sand and rock salt, and a reservoir demonstration. Again, our outstanding volunteers made it all work, including Neal Immega, Debra Balthazar, and Steven Johansen.

Students meet many challenges to participate in this program, including sustaining rigorous academic and professional behavioral performance and overcoming transportation difficulties to reach the magnet schools. In return, they receive a top quality education, including not only the science basics, but also coursework in engineering and earth sciences. It is our privilege to contribute to these programs to help the geoscientists and engineers of the future. If you would like to be part of the volunteer crew making this happen, contact us!

HGS Welcomes New Members

New Members Effective December 2016

ACTIVE MEMBERS	STUDENT MEMBERS
Luis Baez	Presly Carr
Ian Clark	Kristina Duke
Julie Garvin	Libby Ingram
John Gordon	MD Golam Kibria
Lewis Goss	Yi-An Lin
Noah McDougall	Zhengfan Liu
Nicholas Nelson	Maria Neira
Marcie Phillips	Jesse Dean Shumway
Katy Sementelli	Emily Stibbe

Welcome New Members

About the Cover

On November 24, 2016, Tokyo received its first November snowfall in more than half a century. The Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Terra satellite captured this natural-color image the same day. The snow fell in and around the Japanese capital, coating the metropolitan area and accumulating along some sidewalks.

The false-color image from Terra, shown below, shows a stark contrast between snow (blue) and clouds (white). The snow traces the contours of surrounding mountains and is distinguishable from clouds offshore. Central Tokyo is gray-brown in color, suggesting less accumulation or faster melting. Urban centers tend to shed snow faster than surrounding countryside because they are often hotter, a result of the urban heat island effect.

The November dusting was caused by a cold air mass moving down from the Arctic, according to the Japan Meteorological Agency. Meteorologists connected the storm to the Arctic oscillation, a climate pattern that affects the northern hemisphere. Usually, high air pressure in the mid-latitudes prevents colder, low-pressure air seeping down from the Arctic. However, weaker pressure systems occasionally disrupt this barrier, and colder air can penetrate further south, as in this case.

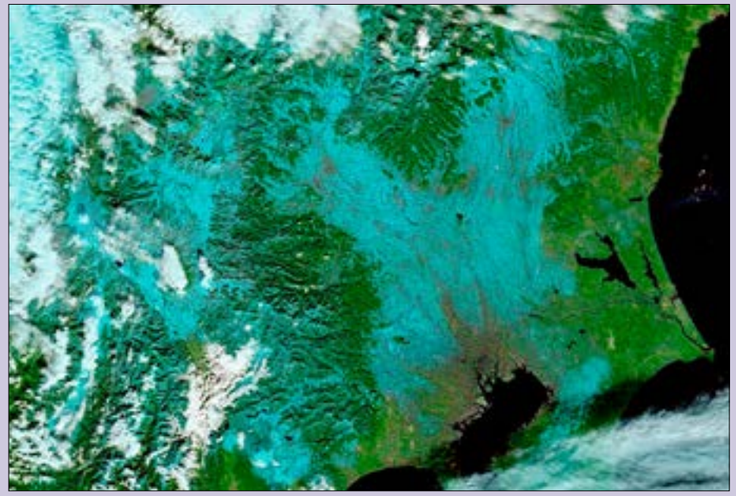


Image from NASA Earth Observatory, http://earthobservatory.nasa.gov/IOTD/view.php?id=89177

Data Interpretation and Integration from a Seismic Perspective – The Excitement of Innovation

GSH presents Luncheon Speaker: Laurie Weston Bellman, 2017 CSEG Distinguished Lecturer
3 locations and dates: February 14, 15 & 16, 2017 For more information and to register go to: www.gshtx.org

Abstract: It's a little cliché to say, but technology is changing so fast that it's difficult to keep up. Computer storage, processing speeds and visualization capabilities continue to grow exponentially; "integration" (however difficult it is to define) is the dream of most geoscience departments and generic "big data" analysis techniques are evolving rapidly – this is indeed an exciting time to be a geophysicist, a scientist, a human being.

Geoscientists are the Google Translate of the oil industry; our job is to translate the coded information in the data we gather to English (or other language of choice). We used to do this with creatively hand drawn and coloured maps and a generous amount of intuition – now we use sophisticated algorithms and powerful visualization, although intuition and creativity are still most definitely required. With all of these new tools, what is the current state of our effectiveness as translators? What are some of the exciting developments? What is the future vision and how do we get there?

Most companies and research groups are working to some degree to incorporate multiple data types (such as seismic data, well logs, production information, microseismic, etc.) in their interpretations of and predictions from the data they acquire; the more pieces of the puzzle added, the clearer the picture. Integration methods range from simple visual comparisons of maps made from two different data sources to numerical modelling and statistical procedures at a basic data level. Quantitative Interpretation (QI) is a broad approach that encompasses many linked techniques in its aim to extract geological properties from seismic data. These geological properties can then be included in analytical methods to determine the key factors in predicting the future performance of a hypothetical well or field.

QI involves a series of analysis steps that each require input datasets, mathematical functions and parameter selections. Choices are made at each point that affect the outcome to some extent, so the more experienced the practitioner; the more times they have seen a particular situation and learned from the results, the better the choices and the higher the chance of a satisfactory outcome. By satisfactory, I mean a realistic prediction of geology from seismic data that not only matches the existing wells, but also predicts the geological conditions in an undrilled location that turn out to be correct. This is an accepted and effective process that has been adopted around the world to reduce exploration and development risk.

Much of the credit for the degree of success of the QI outcome can be attributed to factors that are beyond our control, such as the inherent elastic contrasts and intrinsic properties of the rock, the conditions in the near surface (on land or water), the weather on the day the seismic data were acquired. However if we go beyond face value, regardless of quality, the seismic data always contain more information than we think. QI encompasses the best methods currently available to dig deeper and reveal the hidden information. So, how do we make it better?

Aside from improvements in the theory, which is ongoing, we make QI better by increasing the quality of the inputs, ensuring the appropriateness of the assumptions underlying the mathematical functions, testing the correctness of the parameter choices, and doing everything faster than ever. This plan sounds straightforward, but it's almost never obvious how to make these workflow improvements. This kind of challenge is where big data analytical techniques with a corresponding increase in computer processing speeds and capability (eventually even quantum computing) can be introduced. Seismic data has always been big, but seismic analysis is mostly linear: the output from one process is the input to the next. Analytical techniques allow lateral analysis that geoscientists are only just starting to touch on. Statistics and machine learning are much more mathematical than most of us are comfortable with and the approach doesn't necessarily come easily for geoscientists who are used to seeing a direct cause and effect to their analysis. However, as long as we maintain a good balance of objective mathematical process and subjective geological sense, this new direction should reveal new insights and enhanced efficiencies and, perhaps most importantly, be a catalyst for integration.

But how do we get there? It's hard to argue with the potential benefits of a more complete and thorough analysis of the range of available data, but there is plenty of debate about appropriate and effective procedures, near term objectives, and in a business environment, the best use of limited money. Shortcuts are tempting. Instead of saving money, however, shortcuts usually expose large gaps or inaccuracies in our knowledge – which is not always a bad thing. Collaboration, integration, models of all kinds (scientific and business) and a little bit of faith are therefore necessary to understand, effectively communicate and eventually achieve the ultimate benefits of a significant paradigm shift.

My presentation will not necessarily answer all the questions posed in the abstract, but there will be explanations, examples and opinions.

Laurie Weston Bellman,
Canadian Discovery

CSEG
Canadian Society of Exploration Geophysicists

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.*

The Texas Legislature is now in session. To see which bills are of interest to Texas Geologists, go to the Wise Report: https://www.hgs.org/multimedia_WiseReport

AGI Geoscience Policy Monthly Review (October 2016)

World Energy Council Releases 2016 World Energy Resources Report

The World Energy Council, a United Nations-accredited global energy consortium, released its 2016 World Energy Resources Report on October 12, 2016. Since its inception in 2010 the report has shown a trend toward a more diversified global energy portfolio. The report provides a comparative analysis of global primary energy sources over the last fifteen years.

According to the report, wind and solar energy have increased their share of the global energy portfolio by 0.81 percent and 0.39 percent, respectively; and although oil is still recognized as the primary energy source, its contribution to the global energy portfolio has declined 0.55 percent since 2010.

The report also identifies challenges for future growth of the renewable energy sector. For example, the unstable supply of rare earth elements, which are key components in clean energy technology such as solar panels and electric cars, is listed as a potential limiting factor to growth.

The World Energy Resources Report was released just after the official ratification of the international Paris Climate Agreement. The report states that progress toward a more renewable-dependent global energy portfolio is too slow to meet emissions targets within the Paris Agreement, and that public acceptance of renewable energy sources remains a challenge.

The Current Status of the Paris Climate Agreement

The Paris Climate Agreement reached the minimum requirements necessary to enter into force this October, four years earlier than the previously anticipated 2020 target. At least 55 nations representing at least 55 percent of global greenhouse gas emissions have ratified the agreement, which encourages participating nations to implement practices that ensure global temperatures will not rise more than 2o Celsius over 1850-1900 preindustrial levels.

The latest nations to enter into the agreement are India and the European Union (EU). India ratified the Paris Agreement on October 2, 2016 on Mahatma Gandhi's birthday. The country's leaders were originally hesitant to join the Paris Agreement over concerns that rapidly cutting carbon emissions would hurt India's coal-centered economy. According to the World Resources Institute, India contributes 4.1 percent of total global emissions. The EU voted jointly in favor of the agreement on October 4, 2016 but each member nation is responsible for its own contribution under the agreement.

The United States and China each ratified the Agreement just before the G20 Summit in Hangzhou, China, on September 3, 2016. Because the agreement is non-binding, it does not require ratification by a two-thirds vote in the U.S. Senate. Instead, the Obama administration is treating it as an executive agreement.

Government Update *continued on page 44*

Government Update continued from page 43

Specific actions to achieve the Paris Agreement's goals vary by country and should have been discussed at the 22nd Conference of Parties (COP 22) in Marrakesh during November 2016.

United States and United Kingdom Fund Research on Thwaites Glacier, Antarctica

The National Science Foundation (NSF) and the U.K.-based Natural Environment Research Council (NERC) are partnering to fund $25 million in scientific research to study the Thwaites Glacier in West Antarctica. The research will attempt to shed light on the glacier's accelerated ice loss and how melting glaciers may impact future sea level rise.

The Thwaites Glacier is a marine-terminating glacier which has been losing ice at double its normal rate for the last six years.

The partnership includes a joint program solicitation that will award continuing federal grants for scientific research on the Thwaites Glacier and Amundsen Sea Region. There will be an initial field research staging season from October 2018 through February 2019 and a specific research reason to study the Thwaites Glacier from October 2019 through February 2020. An ad-hoc panel composed of NSF and NERC reviewers will assess the grant proposals.

NERC also announced a series of research objectives to be carried out with U.K. funding alone. These include airborne geophysical surveys and oceanographic monitoring of the Amundsen Sea, ice-sheet layer radar chronology of the Thwaites Glacier basin, ice-velocity mapping, and updating the U.K. Earth System Model (UKESM) that will study enhanced ice-ocean interactions.

President Obama Hosts Frontiers Conference, Opens with $300 Million Investment in Sciences

The White House hosted the Frontiers Conference this October in Pittsburgh, Pennsylvania. The event highlighted national achievements in innovation, science, and technology.

President Obama opened the conference by dedicating over $300 million in new funding for innovative science and technology programs and research. The funding is a mix of federal and private investments and will help cover new research in health and medicine, artificial intelligence, space exploration, small satellite technologies, and space weather resilience.

The conference included many exhibits, such as the Climate Playground, a series of hands-on activities that illustrate the relationship between climate and Earth's systems, and a Geoscience Data Visualization exhibit, which used augmented and virtual reality to educate participants on topics like natural hazards and weather.

NSF and NOAA Partner to Promote Weather Hazards Response

The National Science Foundation (NSF) and the National Oceanic and Atmospheric Administration (NOAA) are partnering to study how to improve communications during severe weather events and to encourage people to respond appropriately.

The joint effort will include research from NSF's Social, Behavioral and Economic Sciences (SBE) Directorate, which conducts research on how people and communities respond during natural disasters, and NOAA's National Weather Service. Their goal is to adapt three SBE research projects to develop an improved set of tools to inform disaster warnings for commercial weather services.

One research project strives to more accurately communicate risk through social media platforms. Another project will identify ill-advised public responses to weather forecasts. The third project will study the public's reaction to extreme weather events.

White House Issues Executive Order Addressing Space Weather

On October 13, 2016, President Obama released an executive order addressing space weather hazards in the U.S. The order lays out the roles federal agencies must play to mitigate space weather and explains how agencies should coordinate across sectors and all levels of government in case of an emergency. The agencies listed in the executive order include the Departments of Defense, Interior, Commerce, Energy, Homeland Security, NASA, the National Science Foundation (NSF), and the Federal Emergency Management Agency.

Under the executive order, federal agencies are required to develop prediction tools for space weather events, coordinate communication plans to notify the public in case of an emergency, and establish community-based mitigation efforts to build resilient community infrastructure.

The order requires NSF to support scientific research improvements to inform space weather mitigation and increase public awareness. It requires NASA to implement a national research program to support the development of space weather forecasting computer models, technology, and sustain overall space weather research.

Each agency is required to submit an initial assessment report on the executive order within 60-120 days of the order's release.

Smithsonian Air and Space Museum Hosts Space Weather Panel

The Smithsonian National Air and Space Museum hosted a panel on October 25, 2016 to discuss advances in space weather research and forecasting. The panel highlighted NASA's STEREO program, which uses two orbiting satellite probes to produce a three-dimensional image of the sun. The program is celebrating its tenth anniversary this year.

At the panel event, NASA scientists explained how detailed images of the sun can help us determine the habitability of other planets and prepare for potentially hazardous space weather events on Earth.

According to panelists, images of coronal mass ejections, or explosions of plasma from the sun's surface that originate from magnetic field disturbances, can be used to determine the habitability of planets. The more exposure a planet has to coronal mass ejections, the less habitable it is because of the increase in harmful cosmic radiation, which has been linked to cancer. One panelist outlined the risks this radiation could pose to astronauts traveling to Mars, which has a much thinner atmosphere than Earth and it is more vulnerable to cosmic radiation.

Additionally, data from the STEREO program could be used in the future to provide real-time space weather forecasts by monitoring sunspots, which indicate magnetic anomalies.

White House Highlights Small Satellite Technology Innovation and Entrepreneurship

The White House announced a new initiative to identify and establish programs to drive innovation using small satellite (smallsat) technology. The White House Office of Science and Technology Policy (OSTP) will lead the Harnessing the Small Satellite Revolution initiative in collaboration with NASA, the Department of Commerce (DOC), the National Geospatial-Intelligence Agency (NGA), and other federal agencies.

As a part of this initiative, NASA will establish a Small Spacecraft Virtual Institute housed at the NASA Ames Research Center in

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California. This institute will serve as a hub of technological information on small spacecraft technology and will promote programs, opportunities, and best practices on the subject. In addition, NASA proposes spending up to $30 million to purchase Earth science observational datasets from non-governmental small satellites.

Also as a part of the initiative, the DOC's Office of Space Commerce will advise decision makers on critical policy issues affecting the commercial space industry, such as smallsat licensing issues; and the NGA will partner with the General Services Administration to establish a central database where individuals can access and purchase commercially-provided imagery, data, analytical capabilities, and services.

Senate Energy and Natural Resources Committee Holds Water Hearing in Hawaii

On October 18, 2016 the Senate Committee on Energy and Natural Resources held a hearing at the Hawaiian State Capitol in Honolulu. The hearing addressed current water resource scarcity issues facing the state and recent water legislation.

Hawaii's freshwater supplies are drawn almost entirely from groundwater aquifers. Decreases in annual rainfall and increases in widespread wildfires have lead to steadily declining groundwater levels in key areas.

Typically, funding for the U.S. Forest Service's preventative management programs is used to support freshwater resources in Hawaii. However, for the past 20 years, funding from this program has been allocated to help pay for emergency wildfire suppression relief, which now accounts for more than 50 percent of the Forest Service's fiscal year 2016 budget.

Hawaii is now taking steps to protect its freshwater resources. Hawaii's Governor David Y. Ige, an active supporter of responsible water management, recently pledged to protect 30 percent of Hawaii's priority watershed forests by 2030 through the prevention of wildfires, planting of native trees, and other forest management activities. He also signed Hawaii's Water Security Act 172 (Act 172) into law, which establishes a water security advisory group to protect Hawaii's groundwater resources by facilitating public-private partnerships to match state funds for groundwater recharge and water efficiency projects and programs.

Remembrance

Ronald Wade Harlan
August 24, 1938 - December 22, 2016

Ronald Wade Harlan, HGS Past President, died December 22, 2016 from complications of Parkinson's disease. Ron was born in Baytown, Texas on August 24, 1938. He graduated from Baytown Lee in 1956 where he was captain of the football team. He played football for U of H and completed his BS and MS in Geology. He then earned his PhD in Geology from Texas A&M.

Ron Harlan graduated in 1966 and proceeded to fulfill his military obligations, attaining the rank of Captain in the Army Corp of Engineers. After serving his country, Ron returned to the Texas Oil Patch where he worked as an Exploration Manager for several oil companies. After retirement in 1998, Ron continued his career as the President of Exron, his own company.

He received many honors including Outstanding Student at University of Houston, President of the Houston Geological Society, and Elder at Memorial Drive Presbyterian Church. Ron met his wife , Dorothy Miller, in a calculus class at University of Houston in 1957. They married in 1960 and began an amazing journey full of adventure, love, and joy including three children which he held dear.

Ron is survived by his wife Dorothy, and his three children, Angela Shatto (Steve), Heather Michie (David), Tearle Harlan (Beth), and seven grandchildren: Chris, Will, and Sam Shatto; Mariah and Jack Michie; and Sophie and Whit Harlan. Please consider making a gift to the Dr. Schiess' Neurodegenerative Disease Stem Cell Therapy Research Fund at http://go.uth.edu/honoryhp17 or 6410 Fannin St # 1014, Houston, TX 77030.

Remembrance

Herbert Gordon Mills
February 20, 1930 – November 22, 2016

Herbert Gordon Mills, 86, passed away November 22, 2016 in San Antonio, Texas. Born February 20, 1930, in San Antonio, to Eben Herbert Mills and Rose Mangold Mills, he was preceded in death by his parents, his sister Rose Ann Northway, and brother Eben Mangold Mills.

Herbert graduated from Alamo Heights High School in 1947 where he played football and was president of his class. In 1951 he was a proud graduate of Texas A&M where he earned his BS in Geological Engineering. His experience in the Corps of Cadets was quite memorable and very formative. He was a Ross Volunteer and Commander of the Armor-Engineer Regiment.

Following 2 years of service in the US Army, he worked for Exxon Company USA which took him from various south Texas towns to New Orleans, New York City and ultimately back to Houston. After retirement in 1987, he and his wife formed Mills Exploration. Herbert was a member of the Houston Geological Society, the AAPG and SIPES.

He was an active member of St. John Vianney Catholic Church in Houston for 43 years. In addition to being a member of the Knights of Columbus, he found great satisfaction in volunteering in various ways through his parish and community. He enjoyed his work on the building committee for the new St. John Vianney sanctuary. Of particular note was his work with the parish school board of St. Francis of Assisi Catholic School, one of Houston's inner city Catholic schools.

Herbert was a proud member of the Association of Former Students of Texas A&M. For the last number of years he supported his beloved Aggies by providing Corps of Cadet scholarships to three students each year.

Herbert was known as "Skip" by many of his friends and family. He enjoyed fishing at the coast, bird hunting with his sons and his Brittany Spaniels, Peaches and Fuzz, and deer hunting, especially in Mason County where he originally learned to hunt with his father and brother. He found joy in singing with the Schola Cantorum at the University of St. Thomas in Houston. Dedicated to his family, he was available to help whenever and wherever needed.

Herbert is survived by wife, Martha Bybee Mills; children Ruth and husband Mark Oordt, Herbert G. Mills, Jr., wife Cindy, and Peter B. Mills and wife Cheryl; grandchildren Andrew, Martha Rose, Carol, Ellen and Catherine Oordt; Anne Marie, Christopher and wife Andrea, Molly and Matthew Mills; Alissa Varga and Josef Varga,wife Sarah and children Charlotte and Landon; and numerous nieces and nephews.

The family will receive friends at The Inn at Los Patios in San Antonio on Sunday, December 4, at 2:30pm. A Mass of Christian Burial will be celebrated on Monday, Dec 5 at 10am at St. Pius X Catholic Church, 3907 Harry Wurzbach Road, San Antonio. Burial will follow at 11:30am at Ft. Sam Houston Cemetery.

In lieu of flowers donations may be made to St. Francis of Assisi Catholic School, 5102 Dabney, Houston, TX 77026, http://sfoacs.org/about-spa/supporting-st-francis/.

Published in *Houston Chronicle* on Nov. 30, 2016 – See more at: http://www.legacy.com/obituaries/houstonchronicle/obituary.aspx?page=lifestory&pid=182829046#sthash.GmSFrq1B.dpuf

Remembrance

Elwin Merrill Peacock

February 5, 1928 - December 10, 2016

Elwin Merrill Peacock was born the 5th of February 1928, in Dallas, Texas to Helen Wainscott Peacock and Henry Bates Peacock. He passed away peacefully in his sleep on Saturday night, the 10th of December 2016.

Elwin was raised in Houston where he graduated from The Kinkaid School. He then attended Rice Institute and graduated from the University of Colorado in Boulder in 1949 with a degree in Geology. He was a member of the Sigma Chi Fraternity. Elwin earned his Eagle Scout badge in 1943 which he considered one of his most memorable accomplishments. Scouting values, especially the Scout Laws, served him as guides for living throughout his life.

Elwin's employment included Sohio Petroleum Company, Signal Oil and Gas, Seiscom-Delta Corporation until he became an independent consulting geophysicist in 1972 until his retirement.

Elwin was active with his career and professional interests. He served in several capacities with many organizations including: Advisory Board for the Department of Geological Sciences at the University of Colorado, President of the Houston Petroleum Club, Honorary Life Member and Secretary-Treasurer of the Society of Exploration Geophysicists, Trustee of SEG Foundation and founding member of SEG Trustee Associates, Honorary Life Member and President of the Geophysical Society of Houston, member of American Association of Petroleum Geologists, Society of Independent Professional Earth Scientists, European Association of Geoscientists and Engineers, and the Houston Geological Society.

Outside of his professional interests, he served as a member of the Hunters Creek Village City Council, Chairman of Hunters Creek Planning and Zoning Commission, and the Board of Commissioners of the Village Fire Department. He was also a member of The Houston Racquet Club where he played the game of tennis and enjoyed socializing with friends.

Elwin was an active member of the Methodist church while growing up in Houston. He served as Chairman of the Official Board for Village Methodist Church in Oklahoma City and Southwest Methodist Church in west Houston. Chapelwood United Methodist became his church for over forty years where he was Honorary Member of the Board of Stewards and Trustee.

He is survived by Jane Breitenstein Peacock, his wife of sixty seven years; daughters Julie Peacock, Houston, Texas, Helen Peacock, Atlanta, Georgia and sons David Peacock and fiance Jennifer Boudreaux of Dallas, Texas and Paul Peacock from Houston, Texas. Other survivors include his brother, Robert B. Peacock and his wife Sidge, of Dallas, Texas; Nieces and nephews include Robert Peacock and wife Becky of Libertyville, Illinois, Kathy Peacock, Plano, Texas, Cathy and Don Beazley of Alachua, Florida, Doug and Lucy McCausland of Arlingon, Virginia, and Suzie Boynton of Westport, Connecticut.

A memorial service was conducted at ten o'clock in the morning on Friday, the 16th of December, in the chapel of Chapelwood United Methodist Church, 11140 Greenbay Street in Houston, where Rev. Bob Johnson, Executive Pastor, officiated.

In lieu of customary remembrances, the family has asked that memorial contributions be directed to the Chapelwood Foundation, 11140 Greenbay, Houston, Texas 77024; or the H.B. Peacock Scholarship Fund at the SEG Foundation, 8801 S. Yale Ave., Suite 500, Tulsa, Oklahoma 74137.

Published in *Houston Chronicle* on Dec. 14, 2016

See more at: http://www.legacy.com/obituaries/houstonchronicle/obituary.aspx?page=lifestory&pid=183074396#sthash.z00Ewald.dpuf

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.

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 or Adobe Photoshop. Files should be saved and submitted in .ai, .eps, .tif or .jpg format. Send them as separate attachments via email or CD if they are larger than 5 MEGs 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 5 MB) or on CD or DVD.

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The *Bulletin* is printed digitally using InDesign. Call the HGS office for availability of ad space and for digital guidelines and necessary forms or email ads@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.**

Random Inside Ad Placement Black & White Prices Shown – Color add 30% to prices below					**Specific Page Color Ad Placement**					
No. of Issues	Random Eighth Page	Random Quarter Page	Random Half Page	Random Full Page	Inside Front Cover Full Page	Inside Back Cover Full Page	Page 2 Full Page	Outside Back Cover Half Page	Back of Calendar Full Page	Calendar Quarter Page
10	$950	$1,350	$2,550	$4,750	$8,000	$7,500	$7,050	$6,850	$6,650	$3,000
9	$800	$1,300	$2,500	$4,700						
8	$750	$1,250	$2,250	$4,300						
7	$600	$1,100	$2,200	$3,850						
6	$550	$950	$1,800	$3,500						$2,000
5	$500	$800	$1,600	$3,000	$4,700	$4,500	$4,350	$4,000		
4	$450	$650	$1,300	$2,500						
3	$300	$550	$950	$2,000						$1,000
2	$250	$400	$700	$1,500						
1	$150	$250	$450	$1,000	$1,500	$1,400	$1,250	$1,000	$1,250	$850
Professional Directory Section Business Card Ad: 10 Issues – $160 ($30 for each additional name on same card)										

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There are currently 5 opportunities to help spread the word about your business or event and generate traffic to your website or campaign. Please submit all ad materials five (5) days prior to the go-live date for testing.

Placement	**Rate**	**Specifications/Description**
HGS Website Home Page Banner Ad	$800 – Monthly $1600 – 3 Months $2000 – 6 Months $3000 – 12 Months	275 x 875 pixels; home page top banner ad. All Home Page Banner Ads rotate every 10 seconds.
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HGS Website Event Page Ad	$600 – Monthly $1200 – 3 Months $1600 – 6 Months $2600 – 12 Months	200 x 400 pixels; calendar page left column ad. All Event Page Ads rotate every 10 seconds.
Geo-Jobs	$50 – 14 days $100 – 30 days $350 – 3 Months $650 – 6 Months $1300 – 12 Months	Posting of job opportunities on HGS website. Click the Geo-Jobs tab to get started. Must be filled out completed and the dates set appropriately.
Vendor Corner	$250 *4 Pack option available. Send request to vendorcorner@hgs.org.	Company logo, company website, and company description will be highlighted on HGS Calendar website event. This is an opportunity to display company wares, gain personnel exposure and hand out product information at HGS dinner meetings.
Bundle & Save!	• 30% off website ads when combined with print ads in all 10 HGS *Bulletin* issues. • 20% off website ads when combined with print ads in 5 HGS *Bulletin* issues. • 10% off website ads when combined with print ads in 3 *Bulletin* issues.	

Application to Become a Member of the Houston Geological Society

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.

Qualifications for Associate Membership (including students)

1) Be involved in the application of the earth or allied sciences.
2) Be a full-time student enrolled in geology or in the related sciences.

Apply online at www.hgs.org and click on Join HGS

Annual Dues Expire Each June 30. (Late renewals – $5 re-instatement fee)

Annual dues are $28.00; emeritus members pay $14.00; students are free.

Mail this application and payment to:

Houston Geological Society
14811 St. Mary's Lane, Suite 250 • Houston, TX 77079-2916
Telephone: 713-463-9476 Fax: 281-679-5504

Payment method:

❑ Check, ❑ VISA, ❑ MasterCard, ❑ American Express, ❑ Discover

Card # _____

Expiration Date: _____ Card I.D. _____

(Card I.D. – 3 or 4 digit number on front or back of card)

To the Executive Board: I hereby apply for q Active or q Associate membership in the Houston Geological Society and pledge to abide by its Constitution and Bylaws. q Check here if a full-time student.

Name: _____

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Circle Preferred Mailing Address: Home Office

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❑ AAPG member No.: _____

Professional Interest:

❑ Environmental Geology ❑ North American E&P (other than Gulf Coast)

❑ International E&P ❑ Gulf Coast E&P (onshore & offshore)

School _____

Degree _____ ***Major*** _____ ***Year*** _____

_____

School _____

Degree _____ ***Major*** _____ ***Year*** _____

Earth Science Work Experience _____

_____

_____

_____

Applicant's Signature _____ ***Date*** _____

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

Name: _____

Signature _____ ***Date*** _____

Membership Chairman _____ ***HGS Secretary*** _____

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