HGS Bulletin
Houston Geological Society
Volume 61, Number 8
April 2019

Rice Night – Come Early To View Student Posters

What Experiments Are Teaching Us About Subduction Megathrust Slip

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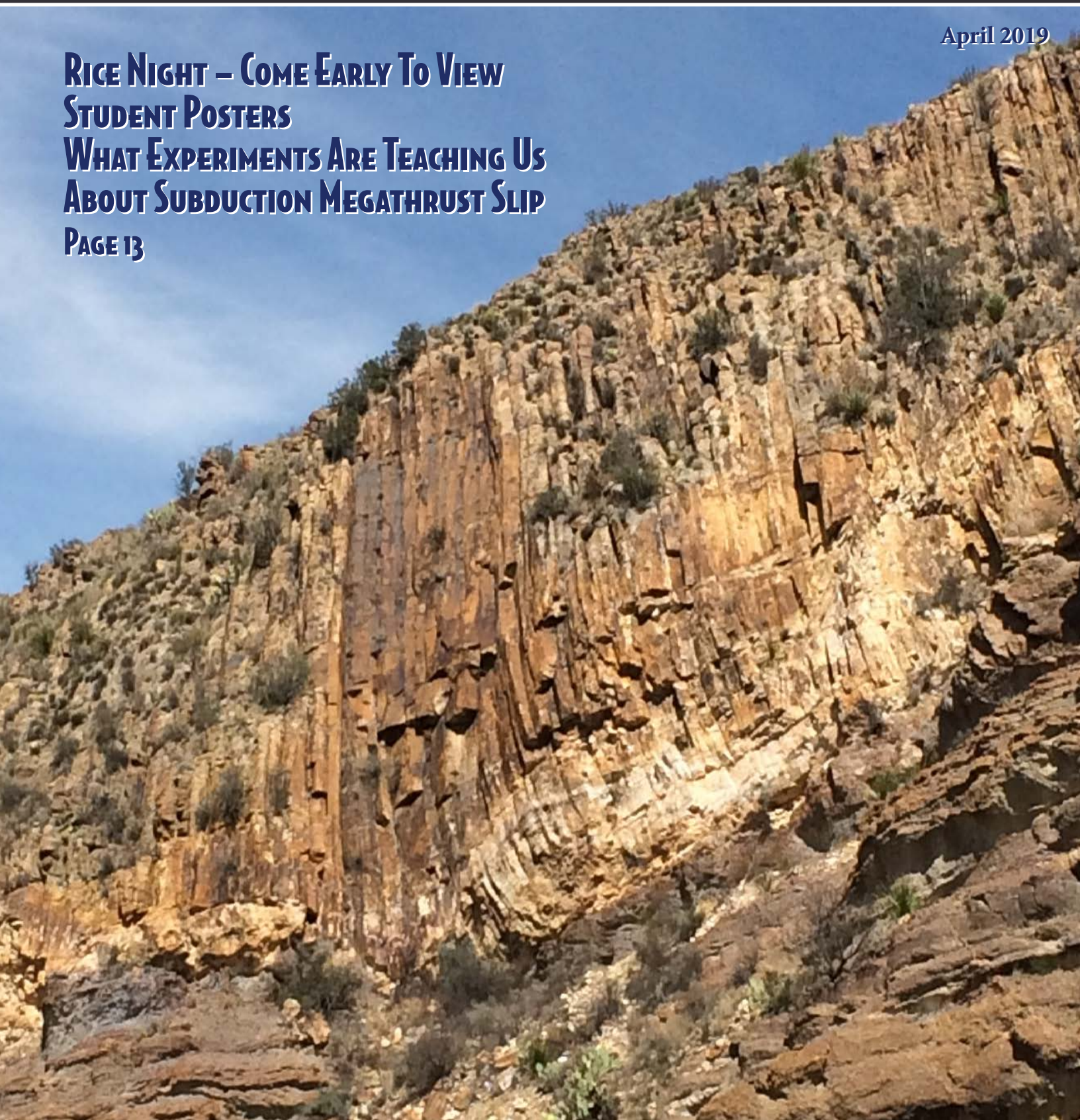

The Bulletin
Houston Geological Society

Volume 61, Number 8 — April 2019

In Every Issue

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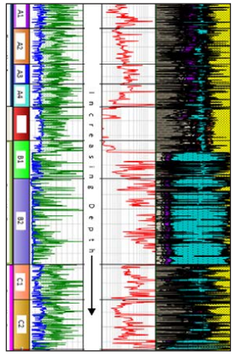

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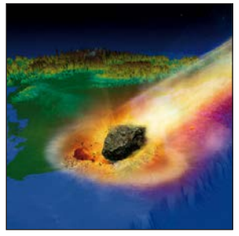

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About the Cover: Strongly columnar-jointed Eocene rhyolite sill intruded into Cretaceous Shutup Conglomerate at the Left Hand Shutup of the Solitario, Big Bend Ranch State Park, Texas (photo by Rachel Tucker).

Two Free Online Geomechanics Courses from Stanford University

Starting April 1, 2019

Unconventional Reservoir Geomechanics

Stanford Professor Mark Zoback and Research Scientist Arjun Kohli have developed a new online course on unconventional reservoir geomechanics. In this course a range of topics are addressed that affect the recovery of hydrocarbons from extremely low-permeability unconventional oil and gas reservoirs. The first part of the course starts with laboratory-scale studies that investigate the composition, microstructure and pore systems as well as fluid flow, physical and deformational properties of unconventional formations. The first part of the course concludes with discussions of basin-scale stress fields, fracture and fault systems as well as pore pressure. In the second part of the course horizontal drilling and multistage hydraulic fracturing are discussed. This part of the course also includes a review of reservoir seismology with an emphasis on microseismic monitoring and interactions among the state of stress, pre-existing fractures and faults and hydraulic fracturing operations to optimize the production process. In the final part of the course the environmental impacts of unconventional oil and gas development are discussed, especially the topic of induced seismicity.

Two lectures are released each week. Participants are free to watch the lectures at any convenient time as long as the homework assignments are completed on time. Those who correctly complete 70% of the 6 homework assignments will receive a certificate of accomplishment.

To learn more about the course and enroll, visit: https://lagunita.stanford.edu/courses/course.v1:EarthSciences+UnconvResGeo208+Spring2019/about

This course follows a new textbook *Unconventional Reservoir Geomechanics: Shale Gas, Tight Oil and Induced Seismicity* by Professor Mark Zoback and Arjun Kohli, published by Cambridge University Press. It will be available in April 2019 from Cambridge University Press: www.cambridge.org/9781107087071 Cambridge University Press is offering a 20% discount on this book to participants in this course with free shipping. The discount code is ZOBACKMOOC

It is also available from Amazon (Print or Kindle): https://www.amazon.com/Unconventional-Reservoir-Geomechanics-Induced.Seismicity/dp/1107087074/ref=sr_1_1?ie=UTF8&qid=1550444180&sr=8.1&keywords=Zoback+and+Kohli

Reservoir Geomechanics

Professor Zoback has taught Reservoir Geomechanics to Stanford students for a number of years and was filmed in 2014. It was first available as a free Massive Open Online Course (MOOC) in the spring of 2014. To date, over 10,000 people have completed the course.

Two lectures are released each week. Participants are free to watch the lectures at any convenient time as long as the homework assignments are completed on time. Those who correctly complete 70% of the 8 homework assignments will receive a certificate of accomplishment.

The course follows the text *Reservoir Geomechanics*, by Professor Mark Zoback, published by Cambridge University Press. It is available from: https://www.cambridge.org/us/academic/subjects/earth-and-environmental-science/applied.geoscience-petroleum-and-mining-geoscience/reservoir-geomechanics?format=PB

Amazon (Print or Kindle edition): https://www.amazon.com/Reservoir-Geomechanics-Mark.DZoback/dp/0521146194/ref=sr_1_1?ie=UTF8&qid=1550273117&sr=8-1&keywords=

Cheryl Desforges
President@HGS.org

Doing More, Faster, with Fewer People, and the Job Outlook for Careers in Geology

It seems that not a day goes by that there isn't a report of some new machine assuming tasks formerly performed by people. General news often reports new automation on manufacturing assembly lines or kiosks taking orders in fast food restaurants. But geoscientists are also in the middle of rapid transition caused by the emergence of automation offsetting some middle-skill geoscience jobs. How to handle and analyze big data sets using artificial intelligence and machine learning are the future of geoscience jobs. We are increasingly being asked to do more work, faster, with fewer people.

The newly published (2019) American Geosciences Institute (AGI) "Status of Geoscience Workforce 2018" reports that the "Bureau of Labor Statistics (BLS), says there was a total United States demand of 311,768 geoscience full-time equivalents (FTE) in 2016, and this number is expected to increase by 11 percent by 2026 to a total of 344,704 FTEs. With approximately 147,000 geoscientists expected to retire by 2026 and approximately 62,000 students expected to be graduating with their bachelor's, master's, or doctoral degrees in the geosciences, the BLS expects there to be a deficit of approximately 118,000 geoscience FTEs by 2026."

…the integration of new technologies will require future geoscientists to be skilled in new ways as the nature of work in the geosciences changes with these developments.

However, even though AGI predicts a shortage of the geoscience workforce over the next decade, they are confident that recent advances in the integration of data science and machine learning, particularly within the resource industries, will continue to yield measurable efficiency and productivity increases which will substantially absorb the deficit in actual individual geoscientists. In fact, the integration of new technologies will require future geoscientists to be skilled in new ways as the nature of work in the geosciences changes with these developments. As I write this column the oil and gas industry is certainly experiencing this transition as technology improves efficiency and causes companies to reevaluate the types of jobs that need to be filled with qualified and trained geoscientists.

This change was inevitable. It's the natural progression of the economy as Adam Smith, also known as "The Father of Economics," described in his book, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776). It was in that book, the first modern work of economics commonly known as the *Wealth of Nations*, that he introduced his theory of absolute advantage. As Wikipedia describes it, absolute advantage refers to the ability of a party (an individual, or firm, or country) to produce a greater quantity of a good, product, or service than competitors, using the same amount of resources.

Today's technology tweaks his theory by allowing for a greater quantity of product using fewer resources. This was the message complete with examples at the most recent HGS symposium, the 2019 Applied Geoscience Conference Subsurface Intelligence and Analytics Conference held March 5-6 at Anadarko Petroleum's offices in The Woodlands. We heard about working applications of automated geosteering, automated log correlation and log editing, automated directional drilling, and machine learning and neural network analysis for interpreting seismic geobodies and picking faults.

Companies are already marketing services that allow geoscientists to work faster. For instance, Geophysical Insights' Paradise software product uses machine learning to find geobodies in seismic volumes, but it takes a person well versed in geology to interpret the stratigraphy of the geobodies. Also, the cloud (remote offsite electronic storage) is becoming the essential element for data management. The days of a geologist spending a lot of time searching for data that may have been saved to another worker's computer, or possibly lost, are drawing to a close.

From the President *continued on page 9*

HGS Shrimp Peel & Crawfish Boil

Friday April 26, 2019 12:00 – 6:00pm

Bear Creek Pioneers Park, Pavilion 6
3535 War Memorial Street, Houston, TX 77084
(Pavilion #6 is located off Bear Creek Dr.)

Boiled Shrimp
Cajun Crawfish
Corn & Potatoes
Beer & Beverages
Live Music!

Ticket Cost
HGS Member- $30
Non-Member- $35
Walk-Ups- $45

Register online at WWW.HGS.org
www.hgs.org/shrimp_peel_2019

Sponsorship Opportunities

Shrimp Sponsor $2000.00 - 6 Complimentary event tickets
Crawfish Sponsor $2000.00 - 6 Complimentary event tickets
Beer & Beverage Sponsor $1000.00 - 4 Complimentary event tickets
Live Music Sponsor $1000.00 - 4 Complimentary event tickets
Platinum Corporate Sponsor $1000.00 – 4 Complimentary tickets
Gold Corporate Sponsor $750.00 - 2 Complementary ticket
Silver Corporate Sponsor $500.00 - 1 Complementary ticket
Bronze Corporate Sponsor $250.00

To be a Sponsor please call Andrea Peoples at the HGS Office 713-463-9476 or email andrea@hgs.org

THUNDER EXPLORATION, INC.

Jim Tucker
editor.hgs@hgs.org

Information Everywhere

We just finished a busy month, filled with several HGS and other programs. March began with the initial HGS Subsurface Intelligence and Analytics Applied Geoscience Conference. The growing awareness of machine applications which can provide fresh ways to look at our information, once it is in electronic form, and hopefully improved interpretive results. But any result is only as useful as the veracity of the data used in these analyses. The qualifying and checking the data used will foreseeably be the critical part of this process.

The CERAWeek held annually in Houston gets bigger and bigger. This year "Agora" sessions were held concurrently with the more widely-reported CERAWeek sessions with petroleum ministers and politicians. These Agora sessions ranged widely over coming technology and diverse energy sources, and the impact on transportation, utilities, manufacturing and lifestyles. The focus was often on the developed world, but also ranged into the Global South, which will be this century's laboratory for many of the changes from our present-day ways. The sessions were videoed, and of particular note was a discussion with Ray and Hunter Hunt of Hunt Oil Company, a very successful private petroleum company now investigating perovskite PV electric generation in addition to their traditional activities. Their video is not yet posted, but watching it may be the most interesting thing you do this month.

We are particularly fortunate in this area for the abundant public information sessions available to all for free, or at very low cost. The HGS naturally sponsors many of these in geoscience areas, but other groups do as well. The University of Houston Energy Forums and presentations at the Baker Institute at Rice University are available for the cost of parking. Get on their email lists. The week after CERAWeek in March had Norwegian Energy Day (interesting coring technology presented), followed by the posters and Dobrin Lecture at UofH, and Rice's annual IRESS covering petroleum relationships to metal ores, lithium, and brines in general. Student posters from the IRESS will be shown during Rice Night at the HGS on 8 April's meeting, so come early and visit with the students and encourage our future colleagues. Look on Page 2 for information on free online courses in geomechanics from Stanford University. They have been involved in this discipline for many years, and one of he early universities to pursue online learning.

I started writing this on the train to Alpine and wrapped it up on the way back. This was the conveyance to our inaugural HGS field trip to the Big Bend Ranch State Park. Four days of the geology of that lovely area, including on the drives to and from Alpine. Our field trip committee worked over almost a year setting this up, and the trip came off excellently. We'll take the lessons learned to make the next one even better. And see Page 15 for the next HGS field trip, closer to home, on faulting in the Houston area on 4 May, as this is always a good trip.

Volunteer for something this month. ■

From the President continued from page 5

Companies like WellDrive are increasing productivity by providing cloud storage and a systematic file structures to accumulate all the millions of files of data for operators and their partners. I have been told that TGS is similarly providing offsite cloud storage for seismic and well logs which will be readily available to their clients. The cloud adds new meaning to the old concept of "central files." By not needing to spend time looking for data, geologists will have much more time for analysis.

As Dr. Edward Jones said at the December HGS Joint HGS TAMU General Dinner: The Future of Artificial Intelligence (AI) Applications in Geology, "artificial intelligence" (AI) should really be rebranded "intelligence augmentation". All the increased efficiency of data access and computer technology allows geoscientists to use statistics to analyze far more metrics from well data to better predict new areas of production and the best ways to develop it.

So, today's geoscientists need to be somewhat of a hybrid. As AGI reports, they not only need a strong technical background in geoscience, but they also need strong quantitative skills to gain and retain employment. In addition to those technical skills, employers continue to desire non-technical skills such as effective communications, and business and finance exposure. Today's careers in geoscience are not for the underachiever. ■

Annual Houston Geological Society Awards

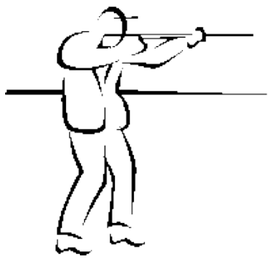
It's Awards Season again. The Oscars, Grammys, Golden Globe and more. Well it's also HGS Award Season as well. The HGS President's Night held in June, is where the Houston Geological Society honors those individuals and companies who are recognized for outstanding volunteering or other major contributions to the Society. These Awards range from giving awards to children who spent many hours cleaning gunk off Mastodon bones that were covered with Hurricane Harvey floodwaters to the HGS Gerald Cooley Award, its highest.

Many awards are presented at President's Night. The most prestigious Award is the **Gerald Cooley Award** given to honor those who have continued to serve the society well above and beyond the call of duty over many years. **Honorary Life Membership** honors members who have distinguished themselves in the science of geology or have contributed outstanding service to the success and welfare of this organization. The **Distinguished Service Award** *honors members who have given long-term valuable service to the society*. The **President's Award** honors members whose extraordinary efforts or unique contributions in a fiscal year or over a short period of time deserve special recognition. **Chairman's Award** honors members whose extraordinary efforts or unique contributions to their committee deserve special recognition. The **Rising Star Award** honors individuals who are relatively new to the HGS or its activities, and have made significant and promising contributions to the enhancement and success of the society. The HGS also recognizes companies with the **Corporate Star Award**, honoring those companies who have made significant contributions to the Houston Geological Society. The **HGS Teacher of the Year Award** has been established to honor individuals whose extraordinary efforts and unique contributions are in earth science education.

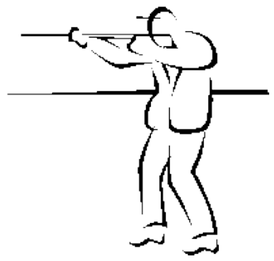
Awards at President's Night vary from plaques, salt lamps, *Orthoceras* bowls, dinosaur heads, dinosaur 3D dioramas, rocks, minerals, and fossils. Some of the most notable Rock Awards given out include the Stibnite mineral given to Gerald Cooley Award honoree Deborah Sacrey. This mineral is an antimony sulfide mineral (Sb_2S_3). Our ancestors would crush this mineral and mix it with oil to make the earliest known make-up. Cleopatra is said to have used this to make the highlighted lines around her eyes. Charles Sternbach received his Gerald Cooley Award which was a Proterozoic Stromatolite fossil from the Bitter Springs Formation, Alice Springs, Australia. This is one of the oldest fossils found. The largest/heaviest Rock Award went to President Ken Nemeth who received a slice of a petrified wood tree trunk from Indonesia. It almost crushed the podium.

This year's HGS Awardees will be recognized in the June HGS *Bulletin*. The HGS Awards Committee looks forward receiving instructions from the HGS Board to make an Award for you. Please send nominations and any supporting materials to mike.deming.HGS@gmail.com.

Rock on my friends. ■



HGS SKEET SHOOT



Saturday, June 8, 2019
Greater Houston Gun Club
6702 McHard Road, Missouri City

This tournament is a 50 target event. Shells are provided, however **you must bring eye and ear protection.** Greater Houston Gun Club and National Skeet Shooting Association safety rules will be in effect. Trophy winning shooters will be determined by the Lewis class system. Door prizes will be awarded by blind drawing after the conclusion of shooting. All competitors are automatically entered into the door prize drawing, but you must be present at the time of the drawing to win. BBQ lunch will be provided from 11:30 until 1:30. Refreshments will be available throughout the day. **Non-shooting guests are welcome to enjoy lunch and refreshments at a cost of $20 per guest.**

HGS recognizes that 2019 is a lean year in the oil patch, and sponsorship for events like this is hard to find. **For $150, you'll receive paid entry for one shooter and one guest (total value of $120) and be listed as a platinum sponsor on the webpage and at the event.**

We are limited to 160 shooters in four rotations. Entry fee is $90 per shooter for registrations received by FRIDAY, JUNE 1st. After June 1, registration will be strictly on a "space available" basis and the entry fee will be $120 per shooter. ***Register early!!***

For more information, contact: Andrea Peoples at (713) 463-9476 or office@hgs.org

For directions to the club, visit www.greaterhoustongunclub.com

****

ONLINE REGISTRATION INFORMATION AT: https://www.hgs.org/civicrm/event/info?id=2078

To pay by check, mail this form with a check made out to HGS to:
Houston Geological Society, 14811 St. Mary's Lane, Ste. 250, Houston, TX 77079

To pay by credit card, please call the HGS office: (713) 463-9476.

Name: _____ Company: _____

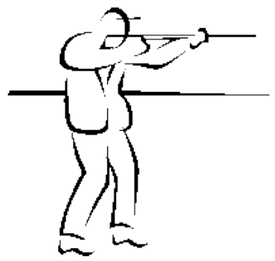
Email: _____ Phone: _____

Preferred time: (circle one) 9:00 10:00 11:00 12:00 Ammo: (circle one) 12 gauge 20 gauge

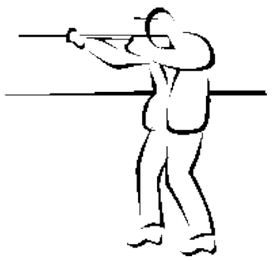
Entry Fees: $ _____ + Guest Fees: $_____ + Sponsor Contribution: $ _____ = Total: $_____

If you wish to register as a squad, please return forms for all squad members together.

ALL SHOOTERS WILL BE REQUIRED TO SIGN A DISCLAIMER OF RESPONSIBILTY BEFORE THEY WILL BE ALLOWED TO SHOOT!



HGS SKEET SHOOT



Saturday, June 8, 2019
Greater Houston Gun Club
6702 McHard Road, Missouri City

Sponsorship Form

AMMO BAG SPONSOR $1,500.00
Registration for a Team of 5
Company recognition on the HGS website, Bulletin and event
LUNCH SPONSOR $1,000.00
Registration for a Team of 5
Company recognition on the HGS website, Bulletin and event
BEVERAGE SPONSOR $750.00
Registration for a Team of 5
Company recognition on the HGS website, Bulletin and event
AMMO SPONSOR $750.00
Registration for a Team of 5
Company recognition on the HGS website, Bulletin and event
FIELD SPONSOR $750.00
Registration for a Team of 5
Company recognition on the HGS website, Bulletin and event
FLURRY SPONSOR $750.00
Registration for 2 team members
Company recognition on the HGS website, Bulletin and event
PLATINUM WEBSITE SPONSOR $150.00
Registration for 1 shooter and 1 non-shooting guest
Company recognition on the HGS website, Bulletin and event

To pay by credit card, please complete the form and return to office@hgs.org or call 713-463-9476
To pay by check, mail this form with a check made out to HGS to:
Houston Geological Society, 14811 St. Mary's Lane, Ste. 250, Houston, TX 77079

Name: _____ Company: _____

Email: _____ Phone: _____

Sponsorship Level: _____ Amount: _____

Credit card # _____ Exp. Date: _____

For more information, contact: Andrea Peoples office@hgs.org
For directions to the club, visit www.greaterhoustongunclub.com

Monday, April 8, 2019

Live Oak Room • Norris Conference Center • 816 Town and Country Blvd #210
Social Hour 5:30–6:30 p.m.
Dinner 6:30–7:30 p.m.

Cost: $40 Preregistered members; $45 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.

Melodie French
Rice University

Rice Night – Come early for lots of student posters in addition to the speaker!

What Experiments Are Teaching Us About Subduction Megathrust Slip

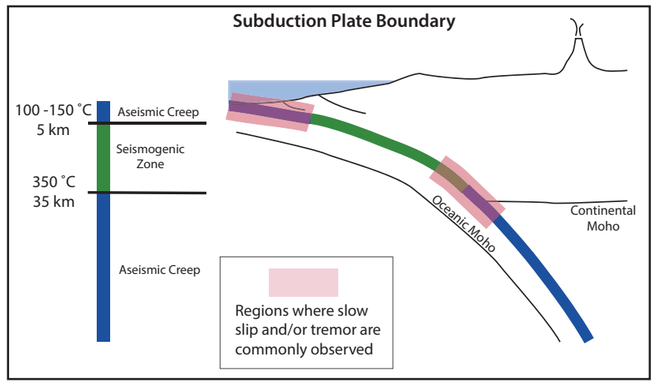


Figure 1. *Modified after similar diagrams by Chris Scholz (1988, 1998, 2002) to reflect the occurrence of slow slip and tremor in subduction zones. The subduction plate boundary has long been known to exhibit shallow (~5 to 10 km) and deep (~35 to 45 km) transitions between creep and seismogenic fault slip. However, enhanced geophysical instrumentation has revealed more subtle behavior, slow slip and tremor, within ~10 km of these transitions. These phenomena have implications for tsunami-genesis at the shallow transition and earthquake triggering at the deep transition. We do not yet know what causes these slip modes to occur.*

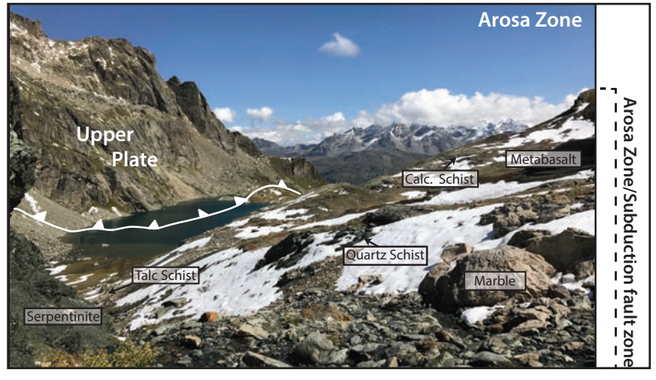


Figure 2. *A field exposure of the Arosa Zone in the Central Alps, where megathrust rocks are exhumed from ~35-40 km depth. The megathrust commonly experiences slow slip and tremor at these depths, and one or more of the many rock types present are thought to control this slip behavior.*

Earthquakes are created by slip along faults kilometers beneath the surface, but not all faults produce earthquakes. We have long known that faults may be seismogenic or slowly, steadily creeping, and physical models explain these behaviors well. Over the past two decades, advancements in seismic and geodetic monitoring technologies led to the discovery that faults regularly slip at rates intermediate between steady creep and co-seismic. These newly discovered phenomena are called "slow slip" and "tremor", and they challenge our understanding of how faults slip.

Slow slip and tremor are primarily observed along subduction plate boundary megathrusts (**Figure 1**), leading to interest in how they may influence seismic hazards and what they may reveal about the physical conditions of the plate boundary at depth. Despite the fact that slow slip and tremor characteristics differ between subduction zones and along a single megathrust, there are consistent patterns emerging on where and under what conditions they are observed. For instance, slow slip occurs over a wide range of temperatures and pressure, but is primarily observed near spatial transitions between seismogenic and creeping parts of the fault zone. There is also reason to believe that one or more of the rock types that exist along the subduction plate boundary may have material properties that result in these "intermediate" slip modes (**Figure 2**). This is because these slip phenomena are most commonly observed in subduction zones, but have also been observed along some strike slip fault segments that were formerly ancient subduction plate boundaries. Finally, there is a growing body of evidence that pore fluid pressures are high near the megathrust where slow slip and tremor occur.

HGS General Dinner Meeting *continued on page 15*

GSH Annual Golf Tournament 2019

The Woodlands Country Club Palmer Course has been chosen to host this year's Geophysical Society of Houston's Annual Tournament. This 27-hole facility is carved out of Texas Pine trees and features undulating and mounded terrain, complete with challenging bunkers and intricate water hazards. This course has become a favorite venue for all levels of golfers.

$200 GOLFER OR $800 PER TEAM

Please register online at www.gshtx.org

Space is limited to 216 players

Sponsorships are still available

For more information contact Wesley Tyrrell:

{e} wesley.tyrrell @katalystdm.com {c} 713.485.9502

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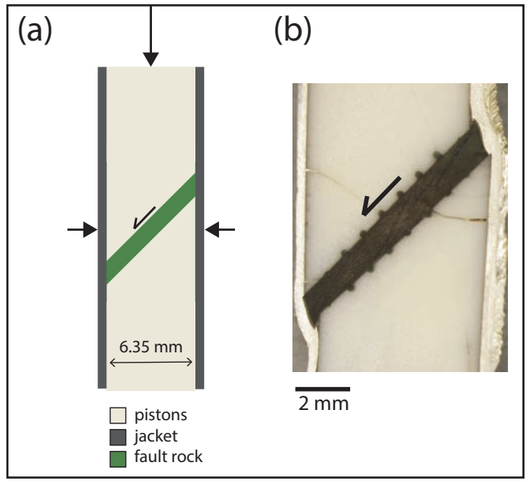

Figure 3. *(a) A cross-section diagram showing the experimental configuration used to test fault rocks. (b) A photograph of an actual deformed sample cut to reveal a cross-section.*

Whether a fault slips destructively, aseismically, or slowly is, in part, a function of the micro-scale properties of the rocks within the fault zone. My group uses high pressure deformation experiments to reproduce the micro-scale processes that occur within fault zones, and micro-mechanical models to relate these processes to geophysically observed slip. We are particularly interested in how the physical properties of megathrust rocks and extrinsic variables like fluid pressure and temperature together control how fault rock deforms, and thus how it slips.

In this presentation, I will review what we know about the phenomena of slow slip and tremor, including where they occur and how they have challenged our old models of faulting. I will discuss hypotheses for what may cause these modes of slip and what their occurrence might tell us about the conditions along the plate boundary at depths up to 50 km. Finally, I will show how deformation experiments in my group are being conducted to test and refine hypotheses for causes of slow slip and tremor. ■

Biographical Sketch

Melodie French is an Assistant Professor in the Department of Earth, Environmental, and Planetary Sciences at Rice University. She joined the faculty at Rice in January 2017, and built a laboratory to study the physical properties of rocks, including fault rocks. She received her BA in physics from Oberlin College, MS in Geology from the University of Wisconsin, and PhD in Geophysics from Texas A&M University. Melodie was an NSF Postdoctoral Fellow at the University of Maryland prior to arriving at Rice.

Surface Faults in West Houston Field Trip (8 CE Hours)

May 4, 2019

Field trip leaders: Carl E. Norman, Ph.D., P.G., C.P.G. and Richard G. Howe, P.G. C.P.G.

Description: Surface faults along the Gulf Coast of Texas and Louisiana are a geologic hazard that cause millions of dollars in damage to commercial buildings, houses, and infrastructure. The damage they cause can be readily seen in west Houston where there are several surface faults.

The trip will begin with a power point presentation at the U.S. Army Corp of Engineers office at the Barker Reservoir and will visit locations that show the surface manifestation of the faults and the damage they cause.

Departure & Arrival Location: Rear parking lot of HGS office building at 14811 St.Marys Lane; Houston, TX 77079

Schedule: 8:00 to 8:30 Registration and breakfast
8:30 Vans leave promptly (2 15-passenger vans)
5:00 Approximate return to the HGS office

Maximum Number of Attendees: 30

Registration Price: $125.00

Includes: Guide book, Continuing Education Certificate (8 CE Hours), continental breakfast, coffee and refreshments, networking lunch

This course is a fund-raiser for the Texas Geoscience Council, the State-wide umbrella coalition of geoscientific firms, professional organizations, and independent geoscientists, established on August 18, 2018 to "support the protection of the health, safety and welfare of all Texans through public education about geoscientific work and advocacy for professional geoscientist licensure in the Lone Star State."

Wednesday, April 10, 2019

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

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.

Lisa Emmet, P.G.
BP America

Bringing it Down – Decommissioning Oil and Gas Onshore Facilities

The current domestic energy landscape in the United States is dynamic. Oil/gas energy production is fast developing in some areas and declining, reaching end of life in other areas. As this dynamic plays-out, retired energy facilities are faced with decommissioning.

The aging infrastructure of historic oil and gas production facilities in North America has created a real need for professionals with decommissioning expertise. It is important to focus on end of life asset management, to define the options for these oil and gas facilities well before they actually reach the end of life. Divestment and future use options should be evaluated before decommissioning commences. Once decommissioning is identified as the best option for a facility, it is important to develop a strategy that identifies the major risks at the facility. There are many pre-assessment activities that will optimize the execution of a decommissioning project, and identifying those activities and the waste that will be generated is a big first step towards a successful completion. Waste characterization and management, asset recovery, regulatory interface, suspension (make safe), scrap/metal management, and restoration are all important elements of a successful decommissioning project. By engaging early in the decommissioning and end of life processes, better and more informed decisions can be made to optimize and bring value to these facility closures.

This presentation will provide an overview of Onshore Oil and Gas Facility decommissioning, and will highlight the unique challenges that Oil and Gas Operators have during decommissioning and demolition activities.

Biographical Sketch

Lisa Emmet currently practices as a Decommissioning and Prevention Manager, for BP America, providing environmental and decommissioning expertise for BP in the Remediation Management function. Throughout her twenty plus years of experience, Lisa has had roles in Exploration and Production as an upstream Geologist, HSSE Program Lead, Environmental Project Manager, and Decommissioning Due Diligence Lead and Project Manager. Since 2006 she has focused her activities on Decommissioning of Oil and Gas facilities at BP. Lisa developed a multi-day training program for decommissioning strategy and execution in concert with colleagues and consultants to train internal BP staff worldwide. She has completed the Facility Decommissioning Training Course through Argonne National Laboratories (ANL) and has completed the Demolition Safety Outreach Training by the National Demolition Association, as well as the 3 day Internal Decommissioning Training at BP.

Lisa earned her BS degree in Geology at the University of Texas at Austin and holds her Professional Geoscientist (P.G.) with the American Institute of Professional Geologists (AIPG) and is a licensed P.G. in the State of Texas.

Tuesday, April 16, 2019

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

Cost: $35 Preregistered members; $40 non-members/walk-ups

To guarantee a seat, pre-register on the HGS website & pre-pay by credit card.
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Changrui Gong, Brian Coffey, Casey Donohue
Apache Corporation, Houston
Lucia Rodriguez
Apache Corporation, Midland

Integration of Inorganic/Organic Geochemistry and Geomechanical Stratigraphy to Characterize Permian Shale Plays

This study presents an integrated inorganic/organic geochemistry and geomechanical stratigraphic methods to characterize Permian organic rich mudstones in the Midland Basin, to understand controls on organic carbon richness, such as primary productivity, depositional environments, sediment supply, and bottom water preservation conditions, and its implications on petroleum generation/charge and on shale oil development.

A high frequency sampling of core samples from a thick sequence (~1000 ft) of argillaceous mudstones, organic-rich mudstones, siliceous mudstones, and carbonate mudstones in the Midland basin were characterized for elemental concentrations and source rock geochemistry, and for high resolution gas chromatography and biomarkers on extracts. The small maturity differences from the top to the bottom of this 1000 ft section and limited migration of hydrocarbons into the rock pore space due to low permeability and high capillary entry pressure allows us to interpret the extract geochemistry fingerprints to compositions of the source rock kerogen and its in-situ generated bitumen.

Geologic, petrophysical, and elemental analysis have divided the section into many depositional packages (chemozones) with distinct signatures. This has suggested cycles of para-sequences with varied sediment (clastic vs carbonate) supply, a likely shift in detrital sediment source and organic matter input, and also changes in bottom water oxygen conditions during the deposition

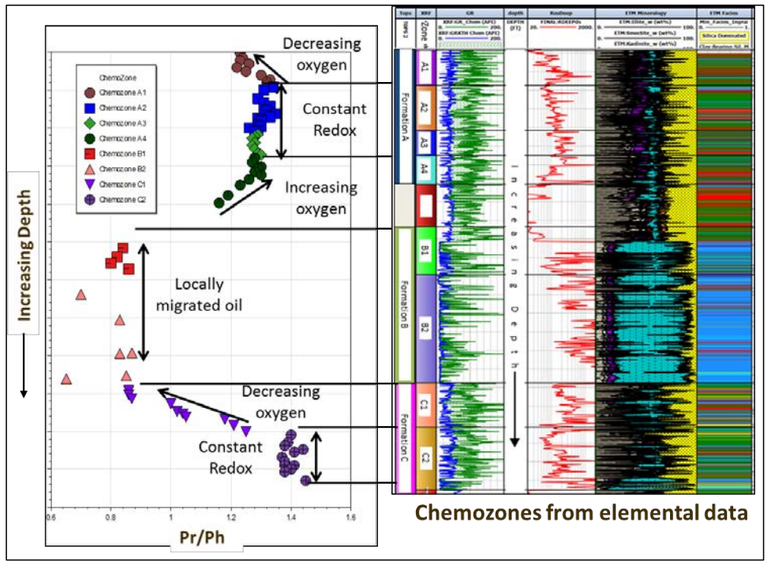

Figure 1. *Elemental data were used to define the minerology and lithology of this cored section and then chemozones (right) reflecting depositional environment variation of para-sequences. Extract organic geochemistry data (Pristane/Phytane ratios, left) suggested corresponding changes in sedimentary diagenetic conditions.*

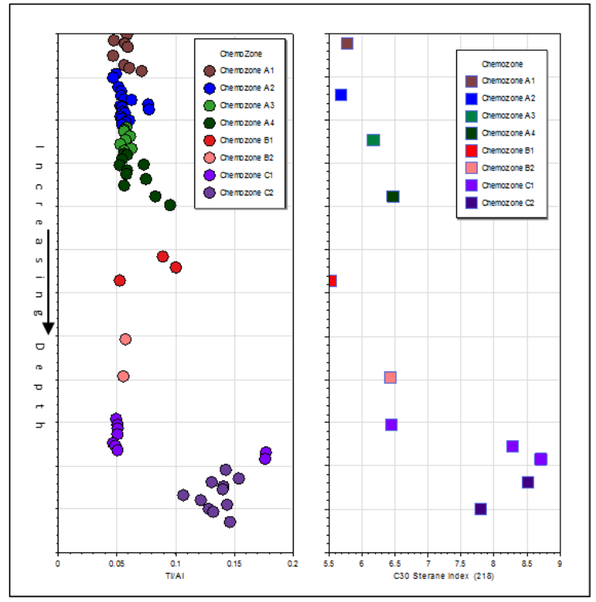

Figure 2. *Depth profiles of Ti/Al ratio (left) and C30 Sterane index (right) show corresponding changes in detrital sediment input and organic matter sources, possibly related to Late Permian glacial/interglacial transition.*

of these organic rich mudstone units. Specifically variations in elemental parameters indicative of detrital sources suggest a significant shift of sediment source area/provenance, probably associated with the transition of late Permian glacial/interglacial climate. A corresponding change in organic matter input is also observed across the glacial/interglacial transition zone. Source rock characters respond to these depositional environmental variations with changes in total organic carbon contents and hydrogen/oxygen index values. Depositional environment dependent biomarker parameters (Pristane/Phytane, Dibenzothiophene/Phenanthrene, etc.) from core extracts also show systematic changes reflecting variations in source rock facies and preservation conditions. Primary productivity, as proxied by Ni concentration in sediment, is the best parameter to explain organic matter enrichment in these sediments, combined with a possible increase in sedimentary anoxia. This integrated approach greatly enhances our understanding of these Permian age resource play petroleum systems, which in turn helps with sweetspot mapping and lateral landing zone definition. ■

Biographical Sketch

Dr. Gong is currently a geological advisor for Apache Corporation's Energy Technology and Technical Services. His specialty covers all aspects of petroleum systems analysis including evaluation of source rocks and petroleum fluid (oil/gas/water) geochemistry; reservoir geochemistry for well communication and production allocation; basin history, source rock maturation, generation, and migration modeling; petroleum charge risking and sweetspot mapping for both resource plays and conventional systems.

He started his petroleum industry career in 1998 as a Senior Petroleum Geologist/ Research Geochemist for ExxonMobil in its New Business Development, Gulf of Mexico Exploration, and Upstream Research groups. Then he worked at BP for six years as a Petroleum Systems Analyst in its Gulf of Mexico Exploration and Exploration/Production Technology groups. He joined Apache in 2011 and has supported E&P activities in world-wide basins such as Permian, Anadarko, Egypt Western Desert, North Sea, Gulf of Mexico, Neuquén, Northwest Shelf of Australia, Guyana, WCSB, and Rocky Mountain basins. Prior to coming to U.S., he was a lecturer on economic geology and natural resources in Hefei University of Technology, China.

He holds Bachelor's and Master's degrees in Economic Geology from China's Hefei University of Technology, and a Master's degree in Geology from the University of Alabama, and a Doctor's degree in Geological Sciences from Northwestern University.

HGS Northsiders Luncheon Meeting

Wednesday, April 24, 2019

Petroleum Club of Houston • 1201 Louisiana (Total Building)
Social Hour 11:15 a.m.
Luncheon 11:45 a.m.

Cost: $35 Preregistered members; $40 non-members/walk-ups

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HGS General
Luncheon Meeting

Ramil S. Ahmadov and Greg N. Boitnott
New England Research, Inc.

Automated Scanning of Fine-scale Geological, Petrophysical and Geomechanical Rock Properties and Its Application in Reservoir Characterization

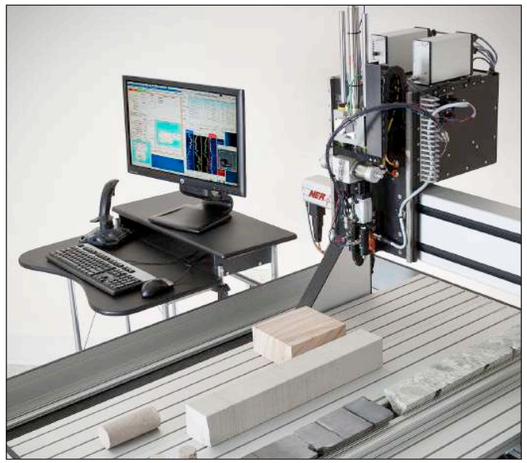

Figure 1. *AutoScan – robotically-controlled gantry system for physical property measurements of several different types of core.*

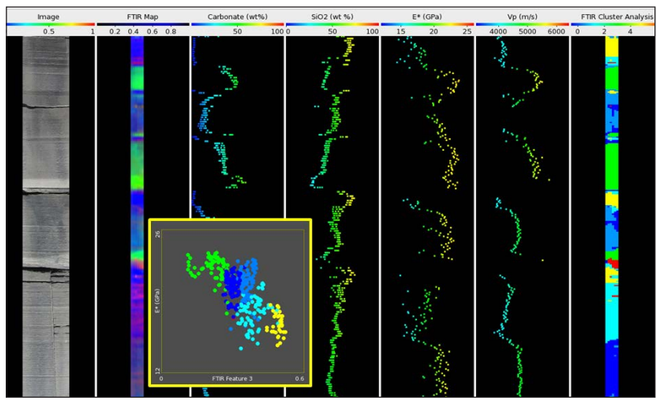

Figure 2. *A representative example from a Permian Basin core showing fine scale heterogeneity information and comparison between mechanical properties and composition.*

In this paper, we will first present the results of the geological, geophysical and geomechanical profiling conducted with an automated set of probes and assess the presence of notable small-scale heterogeneities under the well log resolution. These results will then be compared with fine scale compositional profiles obtained from FTIR measurements at the same locations in order to tie our observations to the lithology. And finally, three examples of use of the data using automatic profiling will be presented to address some of the issues in reservoir characterization.

Introduction

The presence of mechanical heterogeneity under the well log resolution is commonplace in unconventional plays and can deeply impact geomechanical assessments ranging from wellbore integrity to completion design. Thin (<1 inch in thickness) discrete layers may locally exhibit order of magnitude contrast in stiffness and strength relative to the surrounding material. Depending on stress magnitude and orientation, relatively weak or strong layers may lead to unexpected failure, mechanical decoupling between adjacent blocks, and complicate the understanding of fracture propagation by causing additional energy dissipation.

To validate these potential adverse effects, a thorough screening was conducted using a petrophysical scanner on sections of core recovered from the Permian Basin,Vaca Muerta unconventional formation and deep GOM sandstones and shales. The petrophysical scanner was sequentially run with the following probes: Vp and Vs to provide geophysical information, a geomechanical probe named the Impulse Hammer, and an FTIR (Fourier Transform Infrared Spectroscopy) probe to provide mineralogical information, all at the same indexed locations along a vertical profile with a 5 mm spacing.

Method and Examples

New England Research's Core AutoScan (**Figure 1**) is a unique measurement platform developed for the detailed quantitative and efficient description of core properties. It is capable of scanning slabbed and whole core or plugs for gas permeability, resistivity, ultrasonic compressional- and shear-wave velocities, composition, mechanical strength, and elastic stiffness (Impulse Hammer) at the mm scale.

The Impulse Hammer was originally developed to provide a non-destructive method to measure the mechanical profile along a core. The Impulse Hammer captures the physics of the impact by measuring the force-time function at the indenter – a small instrumented sensor is free falling onto the core surface from a preset height. Two independent parameters can be extracted, a reduced Young's modulus and an impulse hardness. The spatial resolution of a single measurement is of the order of 2 mm and the footprint is comparable to that of a micro-indentation test. An example of a representative data set is shown in **Figure 2**.

Conclusions

The combination of fast and non-destructive physical property measurement platorm with workflows capable of relating these measurements across scales is a powerful tool at all stages of field life from exploration and development to production. ■

References

Boitnott, G. N., Louis, L.O., Hampton, J. C., Lionel Martinez, Bernard Labeyrie, Idriss Friry, Alain Lejay High resolution geomechanical profiling in heterogeneous source rock from the Vaca Muerta Formation, Neuquén Basin, Argentina, to be presented, ARMA, 2018.

Gramin, P., Fisher, R., Frooqnia, R.A., Ai, A., Hojnacki, P., Boitnott, G., Louis, L., Hampton, J., Evaluation of the Impulse Hammer Technique for Core Mechanical Properties Profiling, International Symposium of the Society of Core Analysts, Snowmass, Colorado, USA, 21-26 August 2016

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Lejay, Alain, Johannes Monkenbusch, Lionel Martinez, Gregory Boitnott, Laurent Louis and François Gelin., When the syn-depositional climatic variations influence my source rock properties – the case study of the Vaca Muerta, to be presented AAPG, 2018

Rathbun, A.P., Carlson, S.R., Ewy, R.T., Hagin, P.N. and Bovberg, C.A., Boitnott, G. N.,Non-Destructive Impulse Based Index Testing of Rock Core 48th US Rock Mechanics / Geomechanics Symposium held in Minneapolis, MN, USA, 1-4 June 2014.

Biographical Sketch

Ramil S. Ahmadov is a principal geoscientist at New England Research. He is an integrated scientist with experience in conducting pure and applied research in the area of geoscience and engineering who has held various roles at BP, Ikon Science and New England Research. Dr. Ahmadov has considerable experience integrating laboratory, well log, seismic and production data within integrated multidisciplinary teams at all stages from exploration and development to production. Ramil holds PhD and MS degrees in geophysics and geology from Stanford University and BS and MS degrees in petroleum engineering from Azerbaijan State Oil Academy and University of Wyoming, respectively.

Gregory Boitnott is a principal scientist with New England Research, Inc. since 1992, and NER vice president since 2005. He is a designer of the AutoScan and AutoLab systems at NER and is the inventor of NER's patented method for estimating pore structure of earth formations from their petrophysical properties. Boitnott combines laboratory and theoretical studies of fundamental rock properties and studies their relationship to the microstructural variables that control them. His work has resulted in the development of new testing methods and data mining software used for quantitative model building. His current research involves building physical models of heterogeneous and anisotorpic rocks and sediments at the millimeter to meter scale. Boitnott's work is used by NER to understand the implications of heterogeneity in rock physical properties to assist clients in the areas of reservoir engineering, petrophysics and geophysics. Greg holds MS and PhD degrees in geophysics from Columbia University.

HGS General Luncheon Meeting

Monday, April 29, 2019

Live Oak Room • Norris Conference Center • 816 Town and Country Blvd #210
Social Hour 5:30–6:30 p.m.
Dinner 6:30–7:30 p.m.

Cost: $40 Preregistered members; $45 non-members/walk-ups

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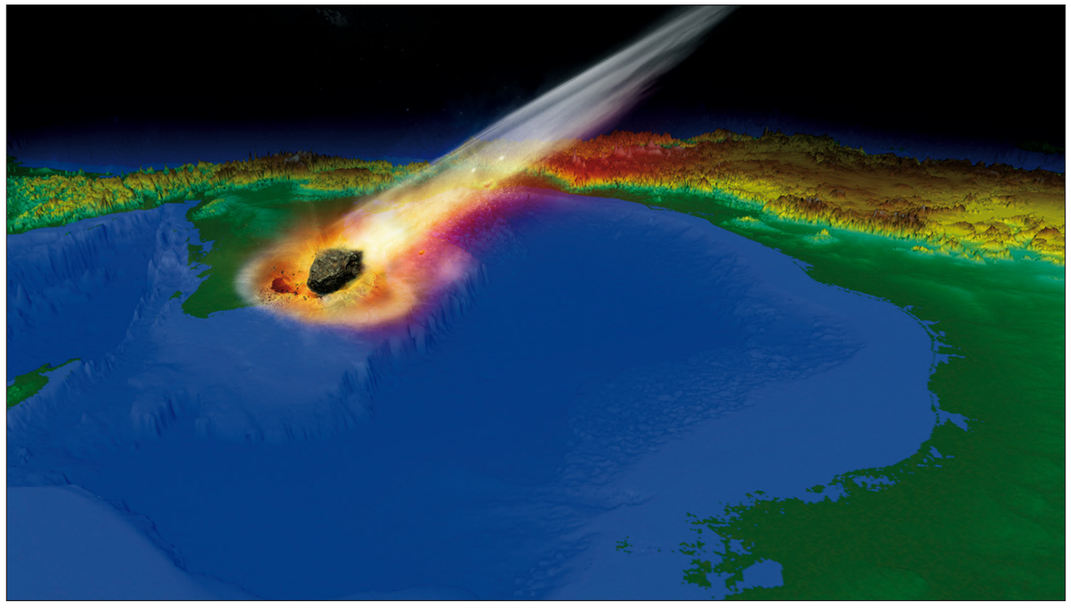
Ian Davison
Earthmoves Ltd.

The Campeche/Sureste Salt Basin SE Mexico: A Tale of Two Shunts and a Bang!



The Campeche/Sureste salt basin has received worldwide attention from the oil industry in the recent past with the remarkable success of the first exploration wells in Mexico since opening to international companies. Talos Energy and partners have discovered more than a billion barrels of oil in Neogene sandstones structured by a salt diapir (Zama); while Eni discovered a similar amount of new oil in a development block. Both discoveries are in shallow waters of less than 200 m, but the geological setting is deep marine turbidites depositing around allochthonous salt sheets flowing at the seabed. This type of setting is routinely explored in the US sector, but in present day water depths of 2000 m or greater. In Mexico, the deepwater setting has been uplifted by 1-3 km during the Chiapeneco orogeny in the Miocene, and to a lesser extent by the earlier Laramide orogeny; so that this setting can even be explored onshore.

This talk describes the dramatic effects of these two shunts on the south Mexican salt basins; which has led to some of the most complex basin geology in the world, offering tremendous potential for giant oil discoveries. To add further spice to this, the largest meteorite impact in the world collided just to the north of the Campeche Basin at 66 Ma; leaving an indelible mark on the geological landscape with up to 400 m of carbonate breccias strewn across the whole Gulf of Mexico. It is these breccias that were affected by the Chiapeneco orogeny, transforming them into world-class oil reservoirs which host more than 100 billion barrels of STOIIP in the Sureste Basin.

Early Geological History

The Campeche salt is interpreted to have been deposited in Bajocian-Bathonian times, at the end of the main extensional rift phase, with the base salt being a fairly continuous flat surface across most of the deepwater salt basin. However, rifting continued around the shallow edges of the basin up to the end of the Kimmeridgian (ca. 150 Ma) and in the ultra-deepwater along the frontal edge of the salt basin in North Campeche. Tithonian source rocks mark the end of rifting when organic-rich shales were draped over the crests of underfilled fault blocks. The main extension direction was probably oriented NNW-ESE, as several ENE-WSW rifts have been identified in the area NW of Cuidade del Carmen. This corresponds to the initial opening direction of the Gulf of Mexico, determined from the orientation of the oldest segments of the oceanic fracture zones defined on the satellite gravity data (Sandwell et al. (2014).

Laramide Orogeny

The salt basin and the sedimentary cover were compressed during the Laramide Orogeny which prograded from Late Cretaceous in the onshore to Eocene offshore. This caused squeezing of salt diapirs which had grown throughout the Jurassic and Cretaceous period. The J-K sediments consist of carbonates in the shallow water and starved clastics in the deep water; no viable deepwater Jurassic or Cretaceous reservoirs have been identified so far. Extensive allochthonous salt sheets where extruded at the seabed during the Eocene throughout the onshore Sureste basin and the shallow water Campeche. However, most of this canopy was removed by later squeezing during the Miocene age Chiapeneco Orogeny. The Eocene canopy is now marked by salt welds with listric faults detaching on the weld surface.

Chiapaneco Orogeny

A second compressional event occurred in the Mid-Miocene (ca. 20 Ma) to the present day with NE-SW directed shortening (Chiapaneco event) associated with formation of the Cocos Spreading Ridge and subduction of this ridge below Mexico. Mid-Miocene compression produced intense squeezing of pre-existing diapirs and withdrawal from the Eocene allochthonous sheets, leading to extrusion of even larger allochthonous salt canopies in mid to late Miocene times. These salt sheets were squeezed and inflated up to 4 km in thickness, and have been continually deformed to the present day by subduction-related stresses. The sheets and underlying sediments have been folded, producing attractive sub-salt anticlinal traps. However, the structures at the top salt sheet level are discordant with the folding at the base salt sheet level making sub-salt seismic imaging difficult.

In areas where the autochthonous salt remained thick and deeply buried, Miocene compression produced salt-cored anticlines and caused folding and overthrusting of Mesozoic carbonate slabs, which were uplifted several kilometres and laterally displaced up to 20 km. Some of the overthrusted carbonate slabs became exposed at or near the seabed soon after the onset of the Mid-Miocene compression. Fracturing and leaching of the exposed carbonate sheets will have significantly enhanced the reservoir potential of the previously deeply-buried Mesozoic carbonates. Many large oil slicks have been identified over these carbonate anticlines, where the salt reaches close to the seabed, but no exploration wells have been drilled to test this play type so far.

A NW downward tilt to the basin was produced during thermal subsidence which has been enhanced by Tertiary sediment loading. This has produced NW-directed downslope sliding with large extensional counter-regional faults developed that detach on the allochthonous salt extruded during the mid-Miocene. NE-trending Pliocene-Recent minibasins developed in the hangingwalls of the counter regional faults. Up to 4 km of clastic sediments were deposited in less than 2 million years within these minibasins, with deposition of key Mio-Pliocene reservoirs of the Magallanes, Cinco Presidentes, and Orca Formations. Such rapid sedimentation implies a significant increase in denudation some 2 Myr ago. This is probably due to enhanced uplift during a compressive phase along the Pacific subduction zone perhaps due to subduction of larger volcanic complexes along the Cocos Ridge..

Biographical Sketch

Ian Davison is Managing Director of Earthmoves Ltd. a UK based consultancy working frontier exploration areas and salt tectonics. He regularly gives industry short courses on Salt Tectonics and regional basin evaluations in Mexico and the Atlantic margins. He is the main author of a best-selling multi-client report on Mexico's hydrocarbon potential. Ian is a Visiting Professor at Royal Holloway, University of London and has published over 80 papers in international journals and books. He has a PhD from the Universities of Leeds UK and Montpellier, France.

HGS International Dinner Meeting

Applied Geoscience Conference

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November 6-7, 2019

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Day 1 PM Session 2 - Optimize Footprint Completion/Stimulations Design
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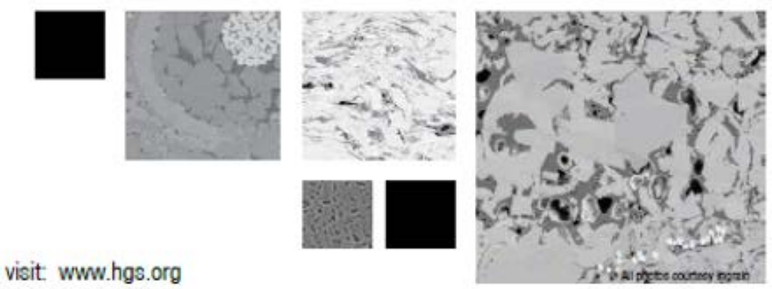

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Early Career Quiz

This is a recollection of useful tools no longer in common use.
It is encouraged to ask a colleague to talk about this.

The winner of a HGS meeting registration is the first respondent to editor.hgs@hgs.org that:

1. Correctly names the items in the picture,
2. Explains their use, and
3. Has worked the fewest number of years and months as a professional geoscientist.

Send your answers to: editor.hgs@hgs.org. Have fun.

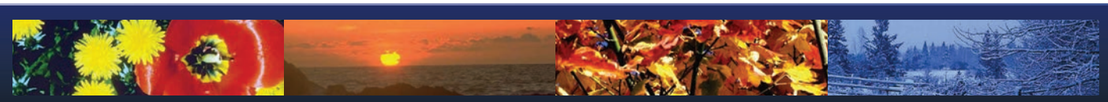
We have a Winner!

The March quiz was won by Peter Steele of the University of Utah, soon to be working in Houston.

While many of us are familiar with their use for counting acreage within contoured areas. He responded "…image contains systematic un-alignment point-count grid templates, and next to the grid in the center of the image are similar un-alignment point count grids of higher precision. These grids are used to quantify the mineralogy and/or texture of soils, petrographic thin sections, core, and hand samples, but most commonly for petrographic analysis. The technique relies on the "random" sampling of individual grains that are chose by aligning the sample with a template's points and describing only the constituents that are "picked" by those points using the desired criteria (mineralogy, grain size, rock mechanics measurements, etc.)."

I think many of us learned something with this one.

April 2019



GeoEvents

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1	2	3	4	5 Don't wait, make your reservations online at hgs.org	6
7	8 **HGS General Dinner Meeting** *Rice Night - Come early for lots of student posters in addition to the speaker! "What Experiments Are Teaching Us About Subduction Megathrust Slip," Melodie French* *Page 13*	9 **HGS Board Meeting** *6 p.m.*	10 **HGS Environmental & Engineering Dinner Meeting** *"Bringing it Down – Decommissioning Oil and Gas Onshore Facilities," Lisa Emmet, Page 17*	11	12 **Take a Kid to the Outcrop Family Campout** *Camp Cullen YMCA, Trinity TX* *Page 4*	13
14	15	16 **HGS Northsiders Luncheon Meeting** *"Integration of Inorganic/Organic Geochemistry and Geomechanical Stratigraphy to Characterize Permian Shale Plays," Changrui Gong, Page 18*	17	18	19	20
21	22	23	24 **HGS General Luncheon Meeting** *"Automated Scanning of Fine-scale Geological, Petrophysical and Geomechanical Rock Properties and Its Application in Reservoir Characterization" Ramil S. Ahmadov and Greg N. Boitnott, Page 20*	25	26 **HGS Shrimp Peel & Crawfish Boil** *Bear Creek Pioneers Park, Pavilion 6, 3535 War Memorial Street, Houston, TX 77084 (Pavilion #6 is located off Bear Creek Drive)* *Page 6*	27 **HGS Tennis Tournament** *Pine Fost Country Club 18003 Clay Road, Houston, TX 77084* *Page 8*
28	29 **HGS International Dinner Meeting** *"The Campeche/Sureste Salt Basin SE Mexico: A Tale of Two Shunts and a Bang!" Ian Davison, Page 22*	30				

Members Pre-registered Prices:

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

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May 4, 2019
Surface Faults in West Houston Field Trip
Page 15

May 19 – 22, 2019
AAPG 2019 Annual Convention & Exhibition
San Antonio, Texas, USA

June 8, 2019
HGS Skeet Shoot
Greater Houston Gun Club, Missouri City, Page 10

June 8, 2019
HGS Guest Night
Houston Museum of Natural Science, Page 16

July 22 – 24, 2019
Unconventional Resources Technology Conference (URTeC 2019)
Denver, Colorado

June 7-15, 2020
HGS Grand Canyon Field Trip
Page 44

Candidates for the 2019–2020 Executive Board

Houston Geological Society Officer Election

The candidates put forth by the Nominations Committee are:

President - Elect: Sarah Gephart Stanley, James W. Tucker

Vice President: Bryan Guzman, Scott Sechrist

Secretary: J.Schulenberg, Tami Shannon

Treasurer-elect: Angela Hammond, Thomas Reed

Editor-elect: Ceri Davies

Directors (2 positions):
Wayne K. Camp, Bob Fryklund, Constantin Platon, Ryan E. Yarrington

HGS Election Voting Instructions

Members will be able to vote in one of two ways:

1. Return the paper ballot that will be delivered in the mail, *OR*
2. Vote online following instructions that will be delivered by e-mail.

PLEASE VOTE – Upon receiving the paper ballot or the e-mailed instructions!

The voting period opens April 10, 2019 and continues to May 10, 2019.

President-elect (two candidates)

Sarah Gephart Stanley

Education
Master of Science (MS), Geology
Ball State University, Muncie, IN
Master of Arts in Education (MA), Secondary Education, Biology, and General Science, Ball State University, Muncie, IN
Bachelor of Science (BS), Education, Biology and General Science major, Earth Science minor, Ball State University, Muncie, IN

Professional Experience
Geophysical Insights, Houston, TX
Senior Geoscientist and Lead Trainer, Since October, 2017 is has been my pleasure to contribute to the efforts of Geophysical Insights in the areas of curriculum development, attribute analysis, interpretation, and client support. In these capacities I have introduced fellow geoscientists to new methodologies in geophysical attribute analyses.

IHS Markit, Houston, TX
Senior Principal, Governance and Common Codes (2016 – 2017)
Selected by upper management to create team dedicated to standardizing IHS Energy input codes, sanitizing data inputs, quality control, data governance, and merging Canadian and US data into single database.
Director, US Operations Training and Certification for IHS Energy Technical Division (2011 – 2017)
Created and managed internal training and certification program that covered 150+ IHS applications for IHS Energy technical staff.
Director of Training, Seismic Micro Technology, Inc. (acquired by IHS MARKIT) (2002 – 2011)

Sarah Gephart Stanley *continued on page 36*

James W. Tucker

Education
Rice University, BA (Geology)
Texas A&M University, MS (Geology)

Professional Experience
Occam Resources (2012-present)
Consultant – Reservoir architecture, structural geology

ARAMCO (2002-2012)
Geologist-Eastern Province exploration, upstream geological research, weekly seminar coordinator, shallow drilling research project

Computational Geology (2000-2002)
Chief Geologist-Dipmeter and structural analysis, software support and special client projects

CGG Americas (1997-1999)
Integrated Studies Manager, General Manager Reservoir Services
Supervise reservoir study projects in Venezuela and Mexico, global interpretation client projects, software and services sales

Consultant (1996)
North African interpretation projects

AtlanticRichfieldCompany (1978-1995)
Geologist – Various exploration and development projects and interpretation in the US midcontinent and Gulf of Mexico, Celtic

James W. Tucker *continued on page 37*

Candidates for the 2019–2020 Executive Board *(continued)*

Vice President (two candidates)

Bryan Guzman

Education
2008 – BS Geology University of Texas at San Antonio
2018 – MS Analytics Texas A&M University

Professional Experience

2007 – 2008	Geo-Tech Balcones Energy Library
2008 – 2011	Geologist – Ingrain Inc.
2011 – 2013	Geoscientist – Ingrain Inc.
2014 – 2015	Product Champion – Drill Cutting Technologies – Ingrain Inc.
2015 – 2017	Senior Technical Sales Advisor – Ingrain a Halliburton Service.
2017 – 2018	Senior Technical Sales Advisor – Halliburton
2018 – Present	Senior Account Manager – TGS

Professional Affiliations
HGS, AAPG, SPE, SPWLA

Professional Activities

2011 – 2017	HGS Chairman Exhibits Committee 2013 – 2014
	HGS Secretary
2015 – 2016	HGS Treasurer Elect
2016 – 2017	HGS Treasurer
2017 – Present	HGS Advertising Committee Chairman
2018 – 2019	GCAGS Treasurer (Houston 2019 Conference)

Statement
Bryan began his career as a geologist for Ingrain Inc in 2008 where he was an integral part of the company's validation period that lead to the commercial launch of their product line and subsequent acquisition to Halliburton. Currently, he works at TGS in the capacity of sales & business development. Over his career he has held positions in operations, research & development, and sales & marketing.

Outside of work, Bryan enjoys personal studies in theology, outdoors activities like hiking or camping, and playing video games. Most of all he enjoys spending time with his wife and two young children.

Ever since I joined the HGS, I have enjoyed the benefits of education, networking, and friendship. Currently, I have been working on ways to grow the advertising for the *Bulletin*,

Bryan Guzman *continued on page 38*

Scott Sechrist

Education
Houston Community College, Houston, TX
Post Baccalaureate Courses 1985-86, for University of Houston/MS Geology program.
S. F. Austin State University, Nacogdoches, TX. Bachelor of Arts Degree 1975- 1977 Electronic Communication R-T-F/Marketing
Southwest TX State University, San Marcos, TX. Bachelor of Arts Degree 1972-1974 Geography/Remote Sensing
Trinity University, San Antonio, TX. Baccalaureate Courses, 1970-1972 Geology/Geography

Professional Experience

2015-present	Acoustic Geoscience Consulting – Multiple Clients in the Gulf Coast and Permian Basin
2014-2015	Grand Gulf Energy Geophysical Consultant
2012-2014	Subsurface Consultants / Noble Energy Deepwater Geophysical Consultant
2006-2011	Subsurface Consultants / Knowledge Reservoir Multiple Clients – Domestic and International
2002-2005	Calpine Natural Gas – Senior Geophysicist
2002-2002	JM Huber Geophysical Consultant
1997-2001	Panaco, Inc. Chief Geophysicist
1985-1996	Acoustic Exploration, Inc
1980-1984	Seiscom Delta United, Petty-Ray Geophysical
1978-1979	Bendix Field Engineering/DOE NURE Program

Professional Affiliations
American Association of Petroleum Geologists – DPA C.P. Geologist #6065; C.P. Geophysicist #90
Society of Exploration Geophysicists – SEG/OTC Oral & Poster Session Judge
Society of Independent Professional Earth Scientists – Continuing Education Committee, Houston
Houston Geological Society –Board of Directors, Shrimp Peel Committees
Geophysical Society of Houston – Electronic Publications, Publicity Committees

Statement
During my 40 years of experience, the HGS has always been there to support me in my career. For Geoscientists of all ages and skill levels, I have observed the HGS to always be the Number One source for Networking; with the highest quality Technical

Scott Sechrist *continued on page 38*

Candidates for the 2019–2020 Executive Board *(continued)*

Secretary (two candidates)

J.Schulenberg

I am honored to stand for secretary of the Houston Geological Society. I've been involved with AAPG and HGS since graduating from the University of Houston with a degree in Geology/Geophysics Option. I am AAPG certified in both geology and geophysics and am a long-standing member of SEG and GSH. I am a founding member of the University of Houston College of Natural Sciences and Mathematics Alumni Association.

Currently serving HGS

- HGS President's Rising Star Award 2018
- Delegate AAPG House of Delegates
- Secretary on the Calvert Memorial Scholarship Board
- Video committee recording presentations at luncheons/special events.

Previously served HGS

- Academic Liaison Co-chair recruiting speakers for the 2018 HGS Flood Conference
- Video team recording the two-day HGS Flood Conference event
- HGS Continuing Education committee
- Special awards judge for HGS at the Annual High School Science and Engineering Fair.

Additional HGS Outreach

I work with numerous colleges to target and encourage the best applicants for the HGS Calvert Memorial Scholarship applications. This effort presents an opportunity to build bridges between university geoscience departments and HGS while encouraging students to become active members in the society.

I truly enjoy giving back to the Society and hope to continue those contributions serving as HGS Secretary in the coming year. ■

Tami B. Shannon

Education

Texas A&M University - Corpus Christi - Master of Science Degree, Environmental Science, 2007
Winona State University - Bachelor of Science Degree, Hydrogeology, 1997

Experience

1997-2000	Systems Engineer, CompuCom Systems
2001-2003	Transportation Engineer, Wilbur Smith Associates
2003-2006	GIS Technician, City of Corpus Christi
2006-2007	GIS Analyst, UT Marine Science Institute
2007-2010	Senior GIS Analyst, Deloitte - Petroleum Services Group
2010-2012	GIS Coordinator, Fugro GeoConsulting, Inc.
2012-2014	Senior GIS Programmer/Analyst, Resource Data Inc
2013-2014	GIS Application Developer, Gulf Interstate Engineering
2014-2015	GIS Project Lead, RPS Knowledge Reservoir
2015-2017	GIS Application Systems Expert, Oxy, Inc
2017-Current	International Appraisal Data Lead, Oxy, Inc.

Professional Affiliations

Houston Geological Society
Geophysical Society of Houston
Texas Board of Professional Geoscientists GIT #46

Professional Activities & Awards

2018-2019	Candidate for HGS Secretary
2016-2017	HGS President's Award
2016-2017	Editor, HGS *Bulletin*
2015-2016	Editor-Elect, HGS *Bulletin*

Statement

Thank you for considering me for your 2019-20209 HGS Secretary. I have been a member of HGS since 2007, when I first moved to Houston and learned of this esteemed organization. As a "silent" member for many years I participated in numerous meetings and events, but in 2015, it was an honor to have the HGS membership elect me HGS *Bulletin* Editor for 2016-2017. I worked closely with the HGS Board and its talented volunteers for over two years to gain great knowledge of the Society and to understand the Board's objectives and inner workings. As a nominee for HGS Secretary for 2019-2020, I am confident my previous experience as HGS Editor and Board member would make me an excellent candidate for this honored position. ■

Candidates for the 2019–2020 Executive Board

Candidates for the 2019–2020 Executive Board *(continued)*

Treasurer-elect (two candidates)

Angela Hammond

As a front end development manager for Shell, Angela does more than manage. With more than sixteen years of experience as a production geologist and development planner, she strives to inspire and develop others. She has worked closely with partners and co-owners, development managers and vice presidents on balancing risk and value tradeoffs, competitively scoping developments, integration, and strategy initiatives. She has enjoyed and had fun working on numerous Deepwater projects (and one unconventional EOR project) over the years from exploration through to first oil. She sees herself as a student of leadership, always working to better herself and others. Angela has been a member of HGS for 16 years, a Trustee on the Undergraduate Student Scholarship Committee for 5 years, is a current member of AAPG, SEG, and a past co-editor of the GCAGS. She has also been the treasurer for her daughter's Girl Scout troop for the past 3 years. ■

Thomas Reed

Thomas worked 29 years in exploration and production as an individual contributor and in management. His career includes onshore and offshore USA, as well as Nigerian Shelf. He is an active member of HGS, GSH, SEG, AAPG, NABG, participates in the annual HGS Applied Geoscience Conference on the Geophysics and Sponsorship committees, and is a Distinguished Toastmaster. During his career he enjoyed sharing his love for earth sciences through career days at public and private schools in Denver, Houston, and Ft Worth. After retiring from Oil and Gas, he joined Edward Jones Investments as a financial advisor in Montgomery, TX. He brings a unique perspective to the HGS treasurer-elect role and is eager to continue giving back to earth sciences in this role. He is 27 years married, has two grown children, both in college. He has an AA degree from Glendale Community College, double BS degrees in Applied Mathematics and Geology from the University of California, Davis, and a MS degree in Exploration Geophysics from Stanford University. ■

Candidates for the 2019–2020 Executive Board *(continued)*

Director – Two-year term *Vote for two candidates*

Wayne K. Camp

Wayne K. Camp is a Distinguished Geological Advisor with Anadarko Petroleum Corporation, The Woodlands, Texas, where he has been employed since 1980 working various domestic and international projects, including supervising exploration and development teams from 1986-2006. Prior to working at Anadarko, Phillips Petroleum Company employed Camp in Houston for two years. Camp received his B.A. degree in geology (with honors) from the State University of New York at Oneonta (1976), and his M.S. degree in geology from Colorado State University, Fort Collins, Colorado (1979). Camp lives in Montgomery, Texas with his wife Joanne, and has two daughters and three granddaughters.

Leadership and Advisory Roles

2003-2004	Chairman, AAPG Unconventional Gas Research Group
2005	Co-chair, AAPG Vail, Colorado Hedberg Conference: "Understanding, Exploring and Developing Tight Gas Sands"
2006	Contributing Editor, AAPG Hedberg Series 3: "Understanding, Exploring and Developing Tight Gas Sands"
2009	Session Chairman and Proceedings Reviewer, Indonesian Petroleum Association
2010	Advisor, America's Natural Gas Alliance (ANGA), Houston, Texas2010-2013 Member, U.S. DOE Unconventional Resources Technology Advisory Committee
2011-2013	Lead Editor and Contributor, AAPG Memoir 102: "Electron Microscopy of Shale Hydrocarbon Reservoirs"
2012-present	Planning Committee Member, Houston Geological Society Applied Geoscience Conference
2013	Associate Editor, "Interpretation for Unconventional Resources", SEG/AAPG Interpretation Journal
2013-2014	Unconventional Theme Chair, AAPG Annual Convention and Exhibition, Houston, Texas, April 6-9, 2014

Wayne K. Camp *continued on page 38*

Bob Fryklund

Bob Fryklund, Chief Upstream Strategist, Energy, IHS Markit, has over 38 years of industry experience focusing on global upstream strategic leadership and has advised on many of industries most revolutionary projects over the last two decades. He has held various executive leadership positions at both majors and leading independents. A recognized Thought Leader on upstream oil and gas, he frequently speaks at key industry meetings, such as the World Economic Forum, CERAWeek by IHS Markit, the Offshore Technology Conference, APLA, and the American Association of Petroleum Geologists Conference. He is also an established media consultant and source for both print and television. Mr. Fryklund serves or has served on several boards and executive committees, including the Association of Petroleum Geologists Advisory Board; the Independent Producers Association of America; the Brazilian Petroleum Institute; the International Energy Agency; the Libya-US Council, a bilateral trade association; and American School of Tripoli. Mr. Fryklund is a member of the Houston Geological Society and the American Association of Petroleum Geologists and has published numerous articles in three languages. Mr. Fryklund holds an AB from Hamilton College, has completed advanced studies at the University of Houston and the University of Tulsa, and holds an advanced certificate in management. ■

Candidates for the 2019–2020 Executive Board

Candidates for the 2019–2020 Executive Board *(continued)*

Director – Two-year term *Vote for two candidates*

Constantin Platon

Education
2011 Master of Science: Geological Sciences @ The University of Alabama, Tuscaloosa, AL
2005 Bachelor of Science: Engineering Geology @ Univ. Al. I. Cuza, Iasi, Romania

Experience

2016-Now	Lone Star College, Houston, TX: Geology Professor (Adjunct)
2015-Now	OAK GeoSciences, Houston, TX: E&P G&G Consultant, Outdoor Educator
2011-2015	Shell E&P, Houston, TX: Exploration Geologist (Brazil, Guyana, Colombia, GoM)
2008-2011	The University of Alabama, Tuscaloosa, AL: Teaching Assistant (Geology)

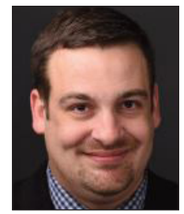
Professional Affiliations
HGS, AAPG, SEPM, GSA, GSH

Professional Accomplishments

2015	responsible for largest commercial hydrocarbon discovery @ Liza-1 well, first deepwater well in Guyana
2011	students changed majors to geology after attending my classes, to become my professional peers

Statement

- Passionate Geologist: expertise in sedimentary geology, salt tectonics, deep-water exploration
- Play Based Exploration, 2D & 3D seismic interpretation, Lower 48 Unconventionals
- Business Skills: data rooms, technical committee meetings with partners & JV
- Romanian Citizen, lived continuously in USA since 2005 (US Permanent Resident/GC)
- Passionate Geologist – Explorer at heart – loves rocks: to study, to climb on, to ride over
- Outdoor Adventurer: mountaineering & bicycle-touring expeditions; happy camper 20+ y
- Outdoor Educator, Tennis Coach, Kayak Instructor, 38 years old, married, 2 young children ■



Ryan E. Yarrington

Education
Houston Baptist University, Bachelor of Business Administration with double majors in Marketing and Business Administration 2005

Experience

2018-2019	Oildex/Drilling Info – Enterprise Account Executive specializing in OSS (Oilfield Services Suite) Oildex Software
2014-2018	MultiClient Geophysical – Seismic Data Marketing Representative focusing on Global Offshore 2D and 3D Seismic Acquisition
2011-2014	Sigma/ESG/Global Geophysical Services- Business Development/Marketing for Onshore Microseismic Acquisition and Engineering services Data Processing, and Reservoir Characterization
2011	HSEQ- Safety Advisor specializing in Environmental laws and procedures

Professional Affiliations
Houston Geological Society
Geophysical Society of Houston

Professional Activities and Awards

2011 - present	HGS International Explorationists Committee Treasurer
2016-2017	HGS Rising Star Award

Statement
I am very honored to once again be nominated for a position on the HGS Executive Board of Directors for the 2019-2020 year. The Houston Geological Society, with its vast history in the Houston area has been integral in providing continuing education opportunities within the Geoscience Industry as well as cultivating a strong sense of community both locally and across the globe. After 8 years of membership and 6 years of volunteering for the HGS in the International Explorationists Group, I would love to expand my involvement in a Society that has made such a significant impact on my life professionally and personally. There are many things that I can bring to the table with a larger role in the HGS. Some of those attributes include flexibility, adaptability

Ryan E. Yarrington *continued on page 39*

Candidates for the 2019–2020 Executive Board *(continued)*

Editor-elect (one candidate)

Ceri Davies

Education
University of Liverpool
Masters of Earth Science, Geophysics with Geology, 2005
PhD in Paleomagnetism, 2009

Experience
CGG Robertson
2010 – 2014 Marketing Geologist
2015 – 2017 Regional Technical Manager
2018 – today Business Development Manager

Professional Affiliations
Houston Geological Society
Geophysical Society of Houston
Rocky Mountain Association of Geologists
American Association of Petroleum Geologists

Statement
With a warm welcome I appreciate the nomination for the Editor-elect role with the Houston Geological Society. Growing up surrounded by the natural world at its best along the coastlines of Wales, I became endeared to the curiosity geology could bring to everyday life.

I have continued that curiosity through my education in Liverpool and followed my career to the largest collection of geologists globally. I enjoy the diversity the Houston Geological Society brings, from the insights of West Texas to the next wildcat adventure offshore. Houston harbors and supports a geologists dream like no other city can.

I look forward to working with the Society and its members to continue in providing the material, presentations and opportunities to keep the curiosity alive. ■

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Sarah Gephart Stanley—*Candidate for President-elect*

Developed Seismic Micro Technology's first full-time training center to support SMT geoscience software. Hired and managed team of trainers Worked with other regions on global projects for clients, such as ONGC, Lukoil, Rosneft, and Hydro, and to meet revenue projections.

Schlumberger, Houston, TX
Curriculum Supervisor, Schlumberger Geoquest
Managed creation and/or upgrades of 29 technical training manuals for GeoQuest. Supervised 3-member staff and numerous subject matter experts. Led certification of new teaching methodology and course content.

Supervisor, GeoQuest Geolab
Oversaw lab and cross-product data integration specialist. Directed release planning, quality control, and efficient testing of data transfers via Geoshare, Geonet, and related products. Managed global internal and external Geoshare support. Promoted Data Flow Integration resources within Schlumberger.

Lone Star College, Houston, TX
Director, Geoscience Technology Training Center at North Harris College
Led and greatly expanded first-of-its-kind beginning and mid-career computer training program for geoscientists. Managed center finances, hired and supervised contract instructors, and prepared business plans and budgets.
Taught and supported Landmark Graphics SeisWorks, GeoQuest IESX, and other geoscience courses, and performed UNIX systems administration for GTTC program and business model that became template used by AAPG in assisting other start-up training centers domestically and internationally.

Consulting Geologist and Adjunct Geology Faculty Member
Instructed Physical Geology courses, labs, and assisted with Geoscience Technology Training Center.

Metfuel, Incorporated, Houston, TX
Area Geologist
Mapped all company properties in Black Warrior Basin coalbed methane project.
Drilled and mapped 500+ wells in less than 365 days.

CSX Oil and Gas Corporation, (TOTAL Minatome CORPORATION), Houston, TX
Senior Geologist, Onshore Exploration and Exploitation

Wainoco Oil and Gas Company, Houston, TX
Geologist, Appalachian Basin and South Texas

Candidates for the 2019–2020 Executive Board *(continued)*

Sarah Gephart Stanley—*Candidate for President-elect*

City Service Company, International Group, Houston, TX
Exploration Geologist, South and Central America

Statement
Throughout my geoscience career, it has been my honor to be associated with the HGS. My affiliation has allowed me to come to know many fine individuals in the petroleum industry. I have also tried to advance the Houston Geological Society through my volunteerism with the AAPG, making sure that the Houston Geological Society is represented nationally. Some of my society highlights include:

- HGS and AAPG Continuing Education Commiittees
- AAPG Sub-Committee Chair for Technical Training Centers
- HGS Employment Committee
- AAPG House of Delegates and HoD Foreman, Long Service Award
- HoD Nominations and Awards committee
- DPA Editor

Awards and Short Courses

- Harrison Schmitt Award (formerly AAPG Special Award)
- HGS President's Award
- Midland College Petroleum Geotechnical Training Program Pioneer Award
- AAPG Mid Continent Short-course on Computer Software
- HGS Shortcourses include:
  - What To Do When the Bottom Drops Out Symposium
  - Unix Basics For Interpreters
  - SeisWorks for Interpreters
  - 3D Visualization Overview Symposium (assisted)

Even though the HGS is the largest local geological society, I feel that we need to continue to expand our outreach through innovation and interaction with our society members and with members of other local societies. I consider it an honor to be nominated for President-elect of the Houston Geological society, and if elected, will do my best to uphold the trust the membership has placed in me. ■

James W. Tucker—*Candidate for President-elect*

Sea, SE Turkey, Ghana and other West Africa, onshore China, and various other areas;
Exploration Planning Director (international)

Milchem Drilling Controls (1972)
Fabrication and field service of desilters, mud centrifuges, and shale shakers

Publications
Various abstracts and short articles

Houston Geological Society Activities

1982-1984	Ballot Committee, member and chair
1998-2002	International Explorationists Committee, member and chair
2014-	Africa Conference Committee
2017-2019	Editor-Elect and Editor

Other Professional Activities

1984-1988	LA Basin Geological Society; Treasurer, Secretary, Vice-president, President
1992, 1997	Dallas Geological Society; cofounder of the International interest group, *Newsletter* Editor
2011-	Dhahran Geoscience Society; AAPG councilor
1990-1995	AAPG; *Bulletin* Associate Editor
2014-2016	AAPG; Treasurer
	AAPG Delegate or Alternate from Los Angeles, Dallas, Dhahran, and Houston

Memberships
HGS, AAPG, GSA, AGU, AIPG YBRA, SPE

Certifications and Licenses
AAPG Certified Petroleum Geologist #3472
AIPG Certified Professional Geologist CPG-7224
California Registered Geologist License No. 4386
Texas Licensed Geologist License No. 2182

Statement
I joined the Houston Geological Society when I was transferred to Houston in the summer of 1980 and have maintained my membership since then, including when located elsewhere, since I knew I would be back. I have always looked at local societies as the first circle of my professional involvement, and have participated in them wherever I have been located. I have been in societies near insolvency with declining memberships, and societies with robust membership and funds, and learned from all of them.

It is important that the HGS continue to serve Members. Our size, as the world's largest local geological society, allows us to have many and varied programs, publications, training courses, public and youth programs, and social activities, as well as providing scholarships for our future colleagues. This will continue as we add

James W. Tucker *continued on page 38*

Candidates for the 2019–2020 Executive Board *(continued)*

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James W. Tucker—*Candidate for President-elect*

innovative activities to our current ones while maintaining prudent economies. We prepare for the future by constant diligence and continuing involvement of our Members. We are a volunteer organization, and that is our strength, and carries the obligation to participate where interested.

It is an honor to be nominated for President-Elect/President, and I will work hard to engage Members and the larger community. I look forward to HGS participation for many years to come. ■

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Bryan Guzman—*Candidate for Vice President*

website and HGS organized conferences. Until recently, I have spent much of my time working on the exhibits committee organizing the set-up and transportation of the HGS booth for various conventions throughout the year. When I served as HGS Secretary, it afforded me the opportunity to learn more about the many functions of the HGS when compiling the monthly board meeting minutes. I was also exposed to the financial side of the organization as the HGS Treasurer-elect and Treasurer where I witnessed the society's dedication to the various efforts through the annual budget. It has been a pleasure meeting many people along the way and I am thankful to the opportunities the HGS has provided me while serving as a chairman, secretary and treasurer. It would be my great pleasure to serve in the capacity of HGS Vice President. ■

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Scott Sechrist—*Candidate for Vice President*

Meetings and Continuing Education presentations in the industry.

As an HGS member, I have volunteered through the years in a wide range of events: working at the registration table for Technical meetings, stuffed convention bags, participated in Science Fair judging, volunteered at Shrimp Peels and Golf Tournaments, learned how to shoot Skeet and helped to promote the HGS Fishing Tournament, provided liaison with other local geoscience societies and was honored to serve on the HGS Board of Directors.

Now as an Emeritus member of HGS, I feel it is my duty to contribute further to the ongoing success of the Houston Geological Society. In humble recognition of all the benefits HGS membership has provided to me, I would be honored to serve my fellow Houston Geological Society members as Vice President. My first priority will always be to continue the HGS tradition of providing outstanding speakers and topics at HGS Luncheon and Dinner meetings, to benefit the entire HGS membership. I thank you for your consideration and would appreciate your vote. ■

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Wayne K. Camp—*Candidate for Director*

2014-2016	Lead Chairman, SEPM-AAPG Joint Research Conference "Mudstone Diagenesis", Santa Fe, New Mexico, October 16-19, 2016
2016-2017	Vice President, AAPG Energy Minerals Division
2016-2017	Vice Chair, AAPG Energy Minerals Division Annual Meeting Committee
2017-2018	President-Elect, AAPG Energy Minerals Division
2017-present	Lead Editor and Contributor, AAPG Memoir 121 (tentative): "Mudstone Diagenesis: Research Perspectives for Shale Hydrocarbon Reservoirs, Seals, and Source Rocks" (in press).
2018-present	President, AAPG Energy Minerals Division
2018-present	Session Chair, Canadian Society of Petroleum Geologists 2019 Gussow Conference "New Directions in Geoscience for Unconventional Resources: Living at the Interface between Geochemistry, Geomechanics, and Engineering"

Publications (excluding abstracts and posters)

Camp, W.K., 2008, Basin-center gas or subtle conventional traps? in, S.P. Cumella, K.W. Shanley and W.K. Camp, eds., Understanding, Exploring and Developing Tight Gas Sands: American Association of Petroleum Geologists, AAPG Hedberg Series, no. 3, p. 49-61.

Camp, W.K., 2011, Pore-throat sizes in sandstones, tight sandstones, and shales: Discussion: American Association of Petroleum Geologists Bulletin, v. 95, p. 1443-1447.

Camp, W.K., and B. Wawak 2013, Enhancing SEM grayscale images through pseudocolor conversion: Examples from Eagle Ford, Haynesville and Marcellus shales, in W.K. Camp, E. Diaz, and B. Wawak, eds., Electron Microscopy of Shale Hydrocarbon Reservoirs: American Association of Petroleum Geologists, Memoir 102, p. 15-26.

Camp, W.K., S. Egenhoff, J. Schieber, and R.M. Slatt, 2016, A compositional classification for grain assemblages in fine-grained sediments and sedimentary rocks-Discussion: Journal of Sedimentary Research, v. 85, p. 1-5.

Camp, W.K., (in press), Diagenetic evolution of organic matter cements: Implications for unconventional shale reservoir quality prediction, in W.K. Camp, N.S. Fishman, P.C. Hackley, J.H.S. Macquaker, K.L. Milliken, and K.G. Taylor, eds., Mudstone Diagenesis: Research Perspectives for Shale Hydrocarbon Reservoirs, Seals, and Source Rocks, American Association of Petroleum Geologists Memoir 121.

Candidates for the 2019–2020 Executive Board

Candidates for the 2019–2020 Executive Board *(continued)*

continued from previous page

Wayne K. Camp—*Candidate for Director*

Honors and Awards

Best Student Paper Presentation, 1979 Geological Society of America
Best Technical Presentation, 1987 Houston Geological Society
Best Technical Presentation, 2003 Rocky Mountain Association of Geologists
Top 10 Hedberg Paper, 2009 American Association of Petroleum Geologists
R.H. Dott, Sr. Memorial Award, Best Special Publication, 2010 American Association of Petroleum Geologists
Certificate of Merit, 2018, American Association of Petroleum Geologists, Energy Minerals Division

Professional Membership

American Association of Petroleum Geologists (AAPG); Energy Mineral Division (EMD)
Society for Sedimentary Geology (SEPM)
Geological Society of America (GSA)
Houston Geological Society (HGS)
Indonesia Petroleum Association, former member
Rocky Mountain Association of Petroleum Geologists (RMAG), former member
Sigma Xi (Honorary Scientific Research Society), former member ■

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Ryan E. Yarrington—*Candidate for Director*

to new situations, integrity, networking skills, an ability to analyze situations objectively, follow through on commitments, quality communication, a willingness to work with others, a positive disposition, and of course, my fantastic sense of humor! Between those characteristics and the guidance that I receive from other seasoned members of the Board I feel that I could be a strong member of the team. If I am elected Director, I would aim to channel my skills into supporting the various committees that I would oversee and to encourage them with their continued growth in the Society. As a part of the HGS Board as a whole, I look forward to the possibility of being involved in the ongoing success and expansion of the largest local Geoscience society in the country. I hope that I can count on your vote! ■

EPA's Office of Ground Water and Drinking Water invites you to a free webinar

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Computer Based Training on Drinking Water Regulations

Registration link: https://register.gotowebinar.com/register/2751002679055419650

APRIL 3, 2019
1-2 PM EDT

WHY ATTEND?

- Gain an understanding of drinking water regulations.
- Approximately 150 modules that can be customized into individual curriculums.
- Certificate of Completion available once curriculums are completed.
- Additional training modules on Capacity Development, Asset Management, Assessing Financial Capacity, Operator Certification, and Program Collaboration.

What is this webinar about?

The drinking water training system is an online self-paced training system that provides an overview of the national primary drinking water regulations. This online training system is available to anyone interested in learning about drinking water regulations. The online system can be found at the following EPA site: https://cfpub.epa.gov/epa_dwts/dsp_main.cfm.

Participants using the online system start by creating an account. Accounts are used to track customized curriculums created by the participants. As the participants move through their curriculums, progress is tracked, and once a curriculum is completed a certificate of completion can be printed.

Who should attend?

This introduction to the online Drinking Water Training System is open to anyone interested in learning about drinking water regulation.

EPA
OFFICE OF GROUND WATER AND DRINKING WATER

Energy on the Horizon

By Wayne Camp

Over the past several years, traveling with my wife between Houston and Amarillo, I am always struck by the variety of energy sources that I see along the route, and the truly impressive effort required by geologists and many others to bring these geological resources to market for the benefit of all.

Travelling north on I-45, out of sight behind the western edge of the east Texas Piney Woods in Montgomery County, lies the 750 million barrel Conroe oil field. This still active field was discovered in 1931 when geologists applied their trade in the field (rather than behind computer screens as today) seeking out surface expressions of salt domes, locating gas seeps, and applying the new geophysical technology of the era of torsion balance (gravity) and refraction seismic surveys (Carlos, 1953).

Crossing the Madison County line, it's time for a pit stop at Buc-ee's in Madisonville. I see new wells being drilled and put into production as operators apply state-of-the-art horizontal drilling and hydraulic fracture technology to pursue new unconventional resources from tight oil sands in the Cretaceous Woodbine Formation. The rig erected across the parking lot is emblematic of the Texas spirit of accepting new oil field development encroaching urban areas, bringing new activity for local businesses and tax revenue for the County.

Further north (when the leaves are off the trees) one can view the tops of drag lines operating at the Jewett lignite mine to the west of the town of Buffalo, along the historical Eocene Wilcox lignite belt. The mine continues to supply low-cost fuel to local electric power plants.

Also along this stretch of highway in Freestone County, are wellheads from gas wells producing from tight gas sands in the Upper Jurassic Bossier Formation. The Bossier sands were traditionally only thought of as "bail-out" zones in wells drilled for deeper targets (Emme and Stancil, 2002). It is here, during the mid 1990's, that operators began to hone their skills to commercially extract gas from tight formations using lower cost "slick-water" fracks to bring on production new giant gas fields (> 1 TCFG) from reservoirs that were previously noncommercial with gas trading below $2.00/mcf.

At the Navarro County Rest Area near the town of Richland, one can read about the historic Corsicana field discovery in 1895, which became the first field in Texas to produce oil in significant quantities until the discovery at Spindletop in 1901 (Hudnall, 1950). The discovery well followed drilling of a water well in the prior year for the city of Corsicana that encountered oil at 1,027 feet before hitting the artesian aquifer at 2,470 ft (Hudnall, 1950). Only in Texas. Someday I'll stop for one of the Collin Street Bakery's famous fruitcakes.

Subsequent drilling at Corsicana lead to the discovery of the Cretaceous Woodbine pool, a zone which would be later made famous in 1930 by Columbus M. "Dad" Joiner's discovery of the giant 6 billion barrel East Texas field, a 5-mile wide, 40-mile long stratigraphic trap discovered by random drilling (Hudnall, 1950a).

Exiting the Interstate onto US Route 287, we are impressed (and maybe just a little bit annoyed by the traffic) by what seems to be non-stop road expansion projects trying to keep pace with the expanding population growth between Waxahachie and Fort Worth.

Beyond the metropolitan sprawl, one begins to see signs responsible for the population growth. The top of drilling rigs peek out above sound insulating blankets in the suburbs. New gas wells spring up on well-groomed gravel pads, displacing bluebonnets. Workers from oil field supply shops fill parking lots at the local barbeque joints, and new inventory arrives at the automobile dealers.

We soon realize we are driving over the largest gas field in Texas, the Newark East Barnett Shale Field. Bowker (2007) recalls the early history of the field. He credits the persistence of Mitchel Energy during a 17-year period in the 1990s of drilling wells, collecting data, and conducting research (partially funded by the U.S. Department of Energy) to better understand the geology of the unconventional Barnett shale reservoir, and application of slick-water fracture stimulation in then vertical wells.

In 2018, the U.S. Geological Survey published a reassessment of the estimated remaining undiscovered reserves to 53 tcf gas, 172 million bbls of oil, and 176 million bbls of natural gas liquids in addition to the 19 tcf of gas and 68 million bbls of oil that have already been produced (Marra, 2018).

This success story has been retold many times and it is credited with the resurgence of the U.S. oil and gas industry, leading to the discovery of other giant shale gas fields, such as the Marcellus/Utica in the northern Appalachian Basin, the Haynesville in north Louisiana, and Eagle Ford in south Texas.

Leaving the Barnett shale behind, we enter the Texas Panhandle, driving parallel with railroad tracks first built in this area during the late 1800s. This is when we first notice the mile-long rail cars loaded with coal, probably mined in Wyoming, destined for Texas power plants.

Energy on the Horizon *continued on page 43*

Energy on the Horizon

continued from page 41

Over the years we have watched the landscape change in this cotton-producing region, as windmills begin to sprout up on the horizon. Just a few, at first, but more and more appear each year now that the electrical power distribution lines have been built.

During our latest trip, as we drove pass through Electra, Texas (officially known in the State of Texas as the pump jack capital of Texas), we discovered a new windmill farm under construction that expands the length of the Texas Panhandle wind farms over 200 miles. I stopped to take a photograph because I was struck by the juxtaposition of pump jacks in the 108-year old oil field with the new windmills on the horizon, creating a perfect illustration of the evolution of the energy industry.

One might take this as an omen for the end of the oil and gas business. But thinking back on the long history and diversity of fuel sources traversed along this route, and witnessing the prosperity reflected by the population growth, makes me realize that our industry will still play a very key role in providing for the world's increasing energy demand for many more years to come.

Resources of all sorts will remain important, challenging and educating a new workforce and developing the skills and technology required to meet our energy requirements. ■

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HGS Grand Canyon Field Trip
Dates: June 7–15, 2020
Cost: $3700/person

Running one of the many smaller rapids on day 1. Permian Hermit Shale at river level with Coconino Sandstone, Toroweap and Kaibab Limestone forming the cliff. Photo courtesy of Phil Caggiano.

You are invited to join the HGS on its 2020 Grand Canyon field trip. This "Journey Through Time" will weave the geologic story of the Canyon with other natural sciences on display here, the human history in the Canyon, and of course the thrills (and chills) of running many exciting rapids of the Colorado River.

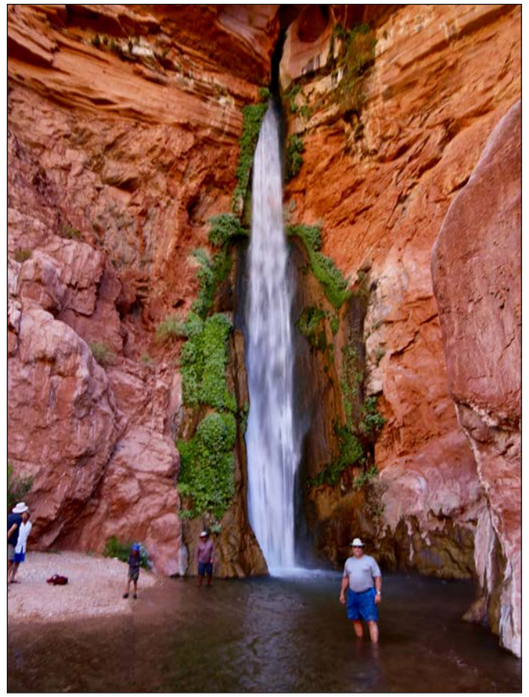
We will float the River on motorized rafts, providing us the opportunity to see and discuss the classic geology so beautifully portrayed here, from some of the earliest Precambrian sediments found in the States up to modern processes which continue to shape the canyon. Geological concepts are introduced and magnificently illustrated in the Canyon such that the geology comes alive for everyone. In addition to running rapids, we will offer a number of short hikes in some of the many side creeks, eat like royalty and sleep under the stars. Your river guides and gear are supplied by Hatch River Expeditions, one of the most experienced outfitters serving the Grand Canyon. Past participants have stated this was the best geologic trip they ever took and many have brought one or more of their family along to share this incredible experience with them.

While this is not an overly strenuous trip, participants must be in good enough physical condition to climb in and out of the rafts. You will have the opportunity to enjoy some hiking each day, the longest being six miles and several require some scrambling. The hikes are always optional; however, I encourage you to participate in as many as you are comfortable doing to fully experience this extraordinary trip.

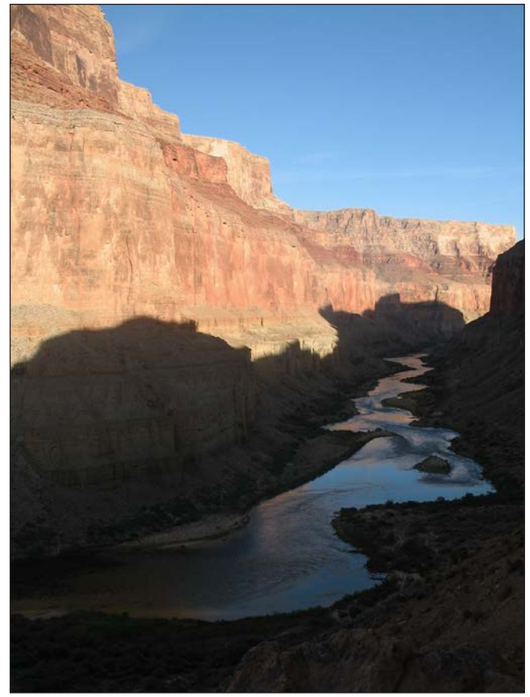
The trip joins in Las Vegas on June 7. We will provide transportation by motor coach from there to Marble Canyon by way of Zion National Park for an opportunity to view the geology there, the first night in Cliff Dwellers Lodge, food and drink for our 8 days/7 nights on the river, a helicopter ride to Bar 10 Ranch the last day, and the flight from there back to Las Vegas. Costs not covered include your round-trip airfare to Las Vegas, first night's dinner and breakfast in Marble Canyon, tips for our river guides, souvenirs purchased at Phantom Ranch or Bar 10 Ranch, and anything you might spend in Vegas should you decide to extend on either end. Optionally, you may join us in Marble Canyon and Hatch will arrange a return flight to there at the end.

Reserve your spot now with a $500 deposit by calling the HGS office at 713-463-9476; the balance due is by December 15, 2019. Please read the HGS's refund policy before booking your trip.

Trip Leader: **Steven Earle** is a Past-President of HGS and also served as Editor and as chair of North American Explorationists. He received his BS in Geoscience from the University of Arizona. While there, he spent as much of his free time as possible hiking the trails of the Grand Canyon. Steve is passionate about the Canyon and loves sharing his knowledge with everyone. After a 40-year career as an oil and gas explorationist, he is now retired in Pagosa Springs, Colorado. This will be Steve's sixth and final time to lead the HGS field trip. ■



This waterfall emerges from the Cambrian Tapeats Sandstone and plunges 100 feet to a lovely pool. Photo courtesy of Phil Caggiano.



The Colorado River winds its way downstream of Nankoweap. We are in Cambrian Bright Angel Shale at river level with Muav and Redwall Limestone forming the prominent cliffs. Photo courtesy of Steve Earle.

HGS Welcomes New Members

New Members Effective March 2019

ACTIVE MEMBERS

Arturo Ayala
Eduardo Carrillo
Wes Ingram
Eric Kelly
Arden Larberg
Ruari Mallon
Aleece Nanfito
Takumi Nemoto
Frank Sattler
Joe Underbrink
Clint Walker

STUDENT MEMBERS

Chris Chapman
Sriharsha Thoram
Johnathan Tindle

ASSOCIATE MEMBERS

David Hamilton
Amanda LaBrie

Welcome New Members

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 back in session. "The Wise Report" is currently following a number of bills that may be of interest to Texas Geologists (TBPG), including two (one in the House and one in the Senate) for reauthorization of the Texas Board of Professional Geoscientists. Both of these bills are identical, so only one needs to pass and be signed by Governor Abbot. Failure to pass one of these bills and/or a veto by the Governor will result in the TBPG disbanding September 1, 2019, leaving a vacuum of persons legally able to sign-off on geological reports to the Texas Commission on Environmental Quality (TCEQ), Texas Department of Transportation (TxDOT), US EPA, and other areas of public practice in Texas. In all probability, those persons who would be allowed to sign for these types of reports, etc. would be Professional Engineers. Professional Geoscientists (PGs) from other states may be allowed, but under current rules, only a PG registered in Texas are allowed to sign these documents.

AGI Geoscience Policy Monthly Review (January 2019)

Senate Confirms Nominations for Energy and Environment Agency Positions

On January 2, 2019, the final full day of the 115th Congress, senators met to confirm a lengthy list of President Donald Trump's nominees by voice vote.

Now halfway through his term, President Trump is still looking to fill many key agency positions in his administration.

According to the Washington Post's Trump administration appointee tracker, while 78 percent of Department of Energy (DOE) positions requiring Senate confirmation have been filled, key positions at the Environmental Protection Agency (EPA) and Interior Department are at 57 percent and 41 percent filled, respectively, as of January 28, 2019.

Some of the prominent geoscience-related agency nominees that were confirmed on January 2, 2019 include Kelvin Droegemeier as director of the White House Office of Science and Technology Policy, Daniel Simmons as DOE assistant secretary for energy efficiency and renewable energy, and Teri Donaldson for DOE inspector general.

Additionally, Mary Neumayr was approved to head the Council on Environmental Quality and Alexandra Dunn was chosen to lead EPA's chemicals office.

Many other nominations failed to advance during the 115th Congress, including Lane Genatowski for director of the Advanced Research Projects Agency-Energy, Christopher Fall for director of DOE's Office of Science, David Vela for director of the National Park Service, and Barry Myers for administrator of the National Oceanographic and Atmospheric Administration, meaning that the president may decide to resubmit these nominations in the current session of Congress or select new candidates to fill the remaining positions in his administration.

Also on January 2, 2019 Kevin McIntyre, formerly the head of the Federal Energy Regulatory Commission (FERC), passed away after a long struggle with brain cancer. Commissioner Neil Chatterjee is serving as acting chairman for FERC until President Trump selects a new nominee.

Moving forward, the administration is awaiting Senate confirmation of Andrew Wheeler's nomination to become administrator of EPA—a position that has been open since July 2018 following the resignation of former EPA chief Scott Pruitt. The Senate Environment and Public Works Committee will vote on Wheeler's nomination on February 5, 2019 after having convened a hearing on the nominee earlier this month. Additionally, the administration will seek to replace former Interior Secretary Ryan Zinke, who resigned from the position in late 2018. President Trump announced on February 4, 2019 that he will be nominating David Bernhardt, the current acting secretary of the Interior Department, to permanently take over the position.

House Lawmakers Introduce Natural Resource Sustainability Bills

Throughout the month of January, several bills were introduced in the House relating to natural resource sustainability, especially at the energy-water nexus.

On January 3, 2019 Representatives Eddie Bernice Johnson (D-TX-30) and Frank Lucas (R-OK-3) cosponsored the Energy and Water Research Integration Act of 2019 (H.R. 34), which directs the Department of Energy (DOE) to consider the critical link between energy and water use in its programs in order to "guarantee efficient, reliable, and sustainable delivery of energy and clean water resources."

This bill also calls for DOE to consider non-traditional water sources and climate impacts on water availability, and to develop a new interagency advisory committee to facilitate energy- and water-related data collection and innovation. The advisory committee is required to help develop yearly technical workshops with non-federal experts and to update Congress every two years on its proceedings.

Representative Scott Tipton (R-CO-3) introduced two energy- and minerals-related bills on January 28. The first bill, the Planning for American Energy Act (H.R. 785), directs the Energy Information Administration to predict the nation's energy needs over the next thirty years. It also requires the Departments of the Interior and Agriculture to create a comprehensive four-year plan for U.S. energy production that incorporates wind, solar, geothermal, natural gas, and other energy sources.

The second bill, the Education and Energy Act (H.R. 786), proposes reallocating royalties from federal mineral and geothermal leases to fund state and county level public education systems. According to Representative Tipton, the bill would send about 50 percent of excess federal revenues to counties and states to support K-12 and public higher education, and 50 percent would go to the federal government's Treasury Department.

The drafting of these bills is reflective of the United States' growing concerns regarding water and energy sustainability. These have been ongoing priorities at the DOE for a number of years, as illustrated by the 2013 creation of the Office of Energy Policy and Systems Analysis and a 2014 report entitled "The Water-Energy Nexus: Challenges and Opportunities."

Senators Murkowski and Cantwell Reintroduce Lands Bill Package

On January 8, 2019 Senators Lisa Murkowski (R-AK) and Maria Cantwell (D-WA) reintroduced a bipartisan package of more than one hundred public lands, natural resources, and water bills, which they negotiated last year with their leadership counterparts on the House Natural Resources Committee.

The lands package—S. 47, the Natural Resources Management Act—was placed directly on the Senate calendar for expedited consideration.

The lands package contains provisions sponsored by a total of fifty senators in the 115th Congress. It includes measures to improve the existing U.S. volcano monitoring network, reauthorize the U.S. Geological Survey's geologic mapping program, and permanently reauthorize the Land and Water Conservation Fund (LWCF). It also includes bills to provide flexibility to reroute the natural gas pipeline authorized in the Denali National Park and Preserve, and to increase the maximum acreage available for inclusion in the Florissant Fossil Beds National Monument.

The 680-page package had previously failed to pass the Senate in late December 2018, after months of negotiations, because of objections from Senators Mike Lee (R-UT) and Rand Paul (R-KY) to past use of the LWCF to acquire more federal land. At the time, Senator Lee offered to waive his objections if Senator Murkowski would accept the addition of language to the Antiquities Act that would require congressional approval for new national monument designations in Utah. Such exemptions currently exist for Alaska and Wyoming. Still, the new lands package does not include the two-word amendment proposed by Senator Lee to exempt Utah from the Antiquities Act.

Senate Majority Leader Mitch McConnell (R-KY) filed a motion on January 31, 2019 to move forward on the public lands package, meaning the Senate will likely consider the bill in the next week.

Also on January 31, 2019 a bipartisan group of senators reintroduced a stand-alone bill to permanently reauthorize the LWCF (S. 302), which gives this particular measure another path to passage if the broader lands package encounters problems. On the House side, Natural Resources Committee Chairman Raúl Grijalva (D-AZ) recently told reporters that he also plans to file a separate bill related to reauthorizing LWCF. ■

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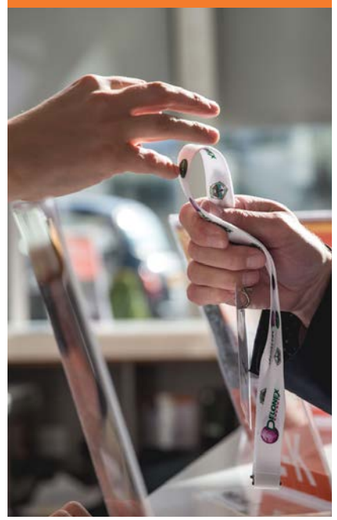

HEADLINE

REGISTRATION | £4,000

Make sure your logo is the first thing they see; this popular option includes your logo being printed on the lanyards and badges given to every person attending the conference.

TECHNICAL PROGRAMME | £4,000

Make sure not to be missed & get in front of your audience all day. The Technical program sponsor will have their logo displayed on the main stage throughout the full two days of the conference. A prominent position to make sure your company stands out from the crowd!

DELEGATE BAGS | £4,000

Make a lasting impression, get your logo on all of the delegate bags. These high-quality satchels or conference folders are not only given to everyone attending as they enter the show but are keepsake items. Ensuring the longevity of your exposure

ABSTRACT VOLUME | £4,000

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EVENING RECEPTION | £4,000

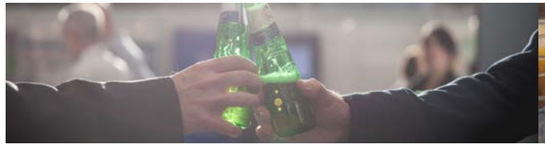
Networking is one of the top reasons people attend any conference, and the Africa E&P Conference . Make sure that your company is the one to get the party started by sponsoring the Evening Reception; the focal point in the Conference social calendar. Sponsorship will include decorating the event in your branding, and a branded cocktail for attendees on arrival.

WiFi | £2,000

This option includes your logo on signage for the WIFI located throughout the seating areas. In addition to having the option to specify password of your choice, meaning everyone attending has to type in your company name each day.

SPEAKER GIFTS | £1,000

Get your logo on the gifts which are given out to all of the high profile industry speakers at the Africa conference.



FEATURE AREAS

SEISMIC THEATRE | £4,000

Back for a second year the second stream of talks at the Africa Conference proved to be a big success! Providing Seismic service companies a better opportunity to 'show off' their data. This sponsorship option would allow you to get your logo on the signage in the theatre, a prime spot to be noticed!

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SPONSORED STUDENT PLACES | £2,000

In order to support the future of our industry we would like to create a programme to support students attending the show. As their sponsor you will be thanked on signage & an article promoting the initiative.

YP NETWORKING | £500

For the first time ever we are planning on running a YP 'speed networking style event. Everyone was just starting out once, this event will facilitate those young or new to the industry in meeting new people to show them the ropes at the conference.

CATERING

OFFSITE ICE BREAKER DRINKS RECEPTION | £3,000

The first event in the show's calendar the Ice Breaker Drinks Reception starts the Africa Conference with a bang! To thank you for your sponsorship your logo will be included on signage of the event, including on the drink points.

BREAKFAST | £3,000

Buy everyone a bacon or sausage sandwich, perfect to start the day off right (or mend a sore head), your logo will be featured on the napkins wrapped around each; so people will know who to thank!

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...is always a vital part of any conference, and as its sponsor you can get your logo on the coffee cups. Get your brand in their hand.

LUNCH | £500 (MAX 2 SPONSORS)

Get your logo on signage on the catering stations over lunchtime.

WATERCOOLERS | £500

They say that humans are 60% water, keep everyone going by sponsoring the water stations, and get your logo on the floorplan at the same time.

CONFERENCE MATERIALS

Sponsoring delegate items make sure that your promotional item goes in the delegate bag given out to each of the attendees.

Pens	£1,000 - SOLD
Notepads	£1,000 - SOLD
Delegate list	£1,000
Exhibitor guide	£1,000
Insert	£500

EXHIBIT

EXHIBITOR BENEFITS

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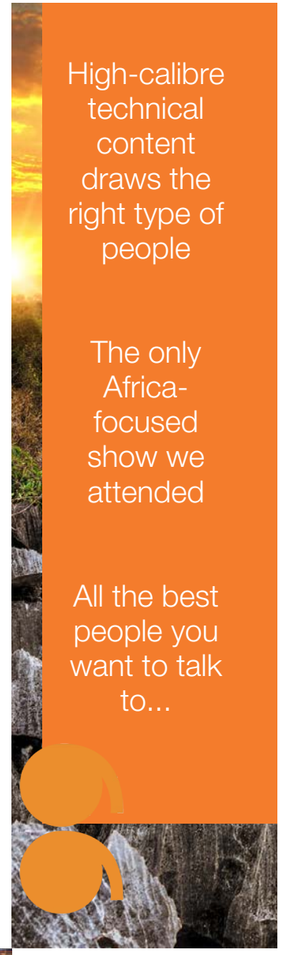
Listing on the event exhibitor list and floorplan, both online and in upcoming PESGB magazines	Complimentary Passes to the Conference 1 with 4sqm booth 2 with 8sqm booth	Complimentary access to the full Africa E&P Conference 2019 delegate list
1 LinkedIn post and 1 Twitter Post, organised by PESGB Conferences Ltd, stating your involvement in exhibiting at the event	Priority access to booking meeting rooms on-site at the event	Access to the Africa E&P Conference 2019 Post-show Report
Access to the exhibition manual to assist your in preparing for the event	Lunch and refreshments provided throughout the day	Access to event photography
Access to the Exhibitor Marketing Toolkit, helping you to prepare your pre-conference marketing	Company details in the onsite exhibitor guide	Opportunity to book your space onsite for the 2021 show before exhibition space opens to new exhibitors
Access to "We're Exhibiting" banner ads for additional marketing	Listing on the online event exhibitor list and on the floorplan in literature and signage	
Access to the pre-conference delegate list, prior to the event, to help you with preparations for the event		

EXHIBITOR MARKETING TOOLKIT

We're committed to helping you make your African E&P Conference 2019 experience as profitable and productive to your business as possible. We will be sending all exhibitors, a copy of the exhibitor marketing toolkit - This pack is intended to act as a helpful checklist and guidelines to support exhibitors in their pre-conference marketing.



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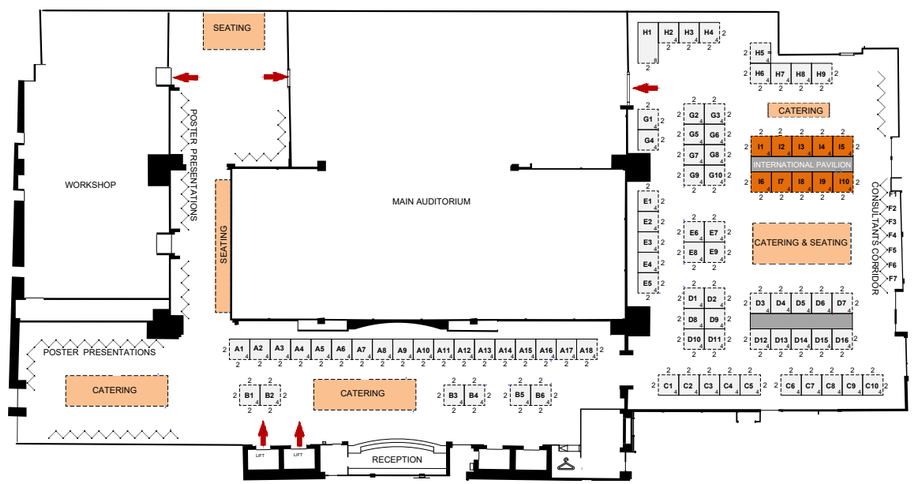

HGS *Bulletin* Instructions to Authors

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

Text should be submitted by email as an attached text or Word file or on a clearly labeled CD in Word format with a hard copy 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.

HGS *Bulletin* Advertising

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)										

Website Advertising Opportunities

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 $1800 – 3 Months $2800 – 6 Months $3600 – 12 Months	275 x 875 pixels; home page top banner ad. All Home Page Banner Ads rotate every 10 seconds.
HGS Website Home Page Column Ad	$700 – Monthly $1500 – 3 Months $2400 – 6 Months $3600 – 12 Months	200 x 400 pixels; home page right column ad
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 $300 – 3 Months $600 – 6 Months $1200 – 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 with 1 FREE bonus event for $1000.00 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.
Event/Short Course Calendar Ad	$100 – Monthly	An event ad posted within the HGS website calendar under the Events tab.
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 $30.00; emeritus members pay $15.00; 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 ❑ Active or ❑ Associate membership in the Houston Geological Society and pledge to abide by its Constitution and Bylaws. ❑ Check here if a full-time student.

Name: _____

Address: _____

_____

Home Phone: _____ ***Spouse's Name:*** _____

Email: _____

Job Title: _____

Company: _____

Company Address: _____

_____

Work Phone: _____ ***Fax Number:*** _____

Circle Preferred Mailing Address: Home Office

Professional Affiliations: _____

❑ 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*** _____

revised 5/02/17

RENEW YOUR HGS MEMBERSHIP
WWW.HGS.ORG

HOUSTON
GEOLOGICAL SOCIETY
14811 St. Mary's Lane, Suite 250 • Houston, TX 77079