Volume 60, Number 5

HGS Bulletin

Houston Geological Society

January 2018

HGS Applied Geoscience Conference

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The Zama Discovery in Salina del Istmo Basin, Offshore Tabasco: "New Dawn" for Offshore Mexico Exploration

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Petroleum Systems in the Permian Basin: Targeting Optimum Oil Production

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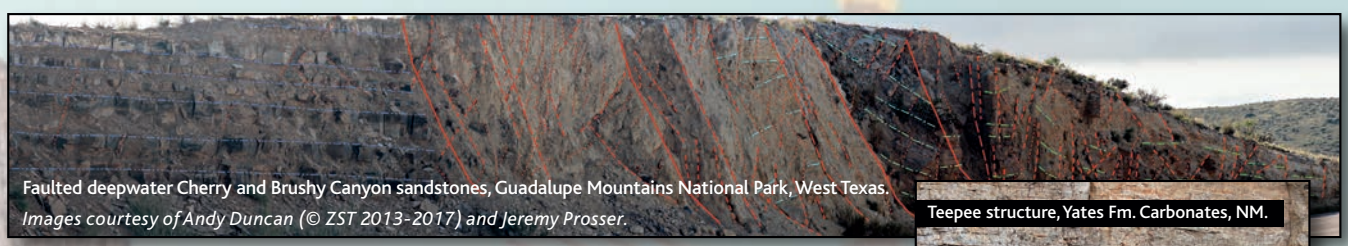
Particularly Unconventional

THE PERMIAN BASIN - NOT SIMPLY UNCONVENTIONAL

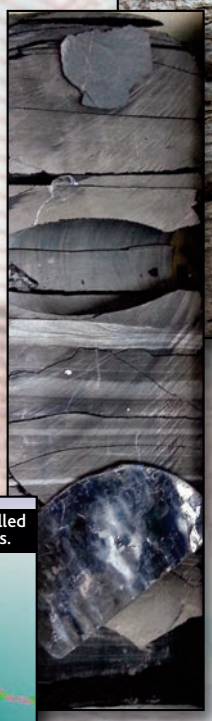
...and not simply one basin, but a complex mix of reservoir types, litho types, depositional and structural settings



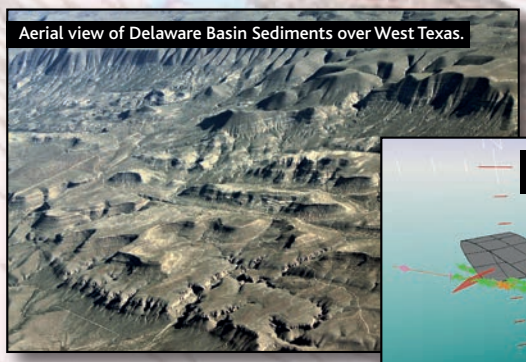
Faulted deepwater Cherry and Brushy Canyon sandstones, Guadalupe Mountains National Park, West Texas.
Images courtesy of Andy Duncan (© ZST 2013-2017) and Jeremy Prosser.

Teepee structure, Yates Fm. Carbonates, NM.

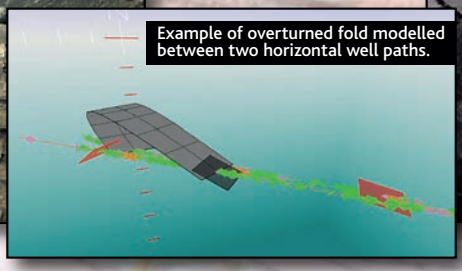
- **Task Fronterra** has subject matter expertise in all major structural and depositional systems
- **Task Fronterra** has vast experience from > 600 wellbores in 16 Counties of the Delaware and Midland Basins, and the Central Basin Platform
- Specialists in the processing and interpretation of all types of image tools using Techlog™, Geolog™ and Terrastation™ software
- Complex structural analysis from multiple wellbores using our ***attitude*** software; with these wellbore visualisation and analysis tools, we can help you to avoid Train Wrecks in well planning with predictive models and help provide solutions to the Head Scratchers.



Cored mudrock reservoir material showing subvertical fracture with slickenside indicating lateral shear *(above)*, and polished surface indicating associated bedding-parallel shear *(left)*.



Aerial view of Delaware Basin Sediments over West Texas.



Example of overturned fold modelled between two horizontal well paths.

VAST EXPERIENCE IN CONVENTIONAL AND NON-CONVENTIONAL RESERVOIRS

Permian Basin Expertise and Services from...

A GLOBAL FOOTPRINT WITH OFFICES IN LOCATIONS IN EUROPE, NORTH AMERICA AND ASIA PACIFIC. COMPLIMENTARY EXPERTISE TO ASSIST CLIENTS IN THEIR UNDERSTANDING OF MATURE RESERVOIRS, CARBONATES, DEEP-WATER FIELDS AND UNCONVENTIONAL HYDROCARBONS.

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The Bulletin
Houston Geological Society

Volume 60, Number 5 January 2018

In Every Issue

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Technical Meetings

Other Features

About the Cover: Svalbard, Norway. Photo by Brian W. Horn

HGS Applied Geoscience Conference

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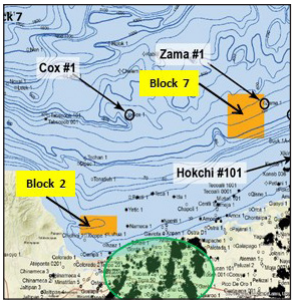

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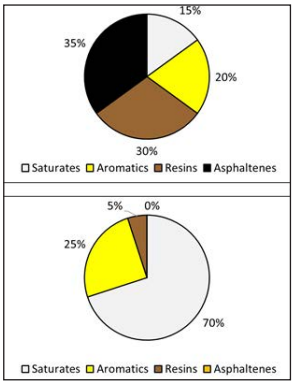

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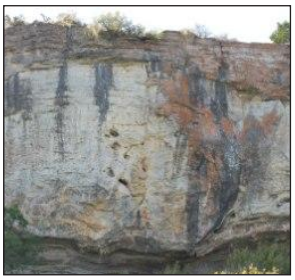

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Second Announcement and Call for Papers

Big Continent - Big Ideas - Big Opportunity

Strategies for Success

The 17th HGS-PESGB Conference on African E&P

September 11-12, 2018 • Houston Texas

This annual conference, alternating between Houston and London, is the primary technical E & P conference on Africa with attendances exceeding 600, including industry operators, consultants, governments, and academia. The 2018 edition will feature a large poster program and about 25 high quality talks covering aspects of E&P across Africa.

Oral presentations will be systematically arranged in themed sessions:

- African E&P in the evolving business environment – Above Ground Risks & Rewards
- New and emerging exploration trends
- Gas (and oil) in N. and E Africa
- Developing and integrating geological concepts: Impact on exploration in Africa
- Big data, AI and innovative technologies applied to African E & P
- What we thought we knew – Exploration concepts to production reality

Invited Keynote and Other Speakers Include:
Respected industry leaders have accepted invitations to deliver keynote presentations. Confirmations include:

- *Bob Fryklund* (Chief Upstream Strategist-IHS Energy) on Africa Exploration
- *Tim O'Hanlon,* VP African Business, Tullow Oil

Further announcements to be revealed in due course; consult HGS and PESGB websites for regular updates www.hgs.org.

Special Session: "Exploration in Africa past, present and future - keys to exploration success and disaster avoidance"
New for 2018 – the conference will include a lunchtime, high level round-table panel discussion involving executives and business leaders from key African exploration companies. Confirmed participants include:

- *Ernie Leyendecker* (EVP Worldwide Exploration, Anadarko)
- *Paul Dailly* (Founding Partner, SVP and Chief Geoscientist, Kosmos)
- *Jayne Baird* (VP Africa and Atlantic Margins Exploration, Woodside)
- *Bob Fryklund* (Chief Upstream Strategist, IHS)
- *Paul Haryott* (Rose and Assoc.)

The panel will discuss recent oil and gas exploration successes and failures and provide strategic, commercial and technical insights in to future opportunities and challenges.

Short Courses:
In association with the conference one or more short courses will be offered. Check the HGS website for details as they become available.

Call for abstract (oral and posters):
Abstracts (up to 2 pages long and can include diagrams) can be submitted immediately and no later than March 15, 2018 to Africa2018@hgs.org. Extended abstracts are normally written once a paper is accepted for collection on conference digital media to be distributed to registrants. Guidelines for abstract submission are available on the website: https://www.hgs.org/civicrm/event/info?id=1931
The best technical contributions will be recognized with prestigious awards from the HGS; as determined by a respected panel of industry judges. The presentation ceremony will take place at the conference close.

Sponsorship opportunities:
Details of sponsorship opportunities and exhibition booths are available at office@hgs.org or on the HGS website. Information on sponsorship opportunities can also be found at https://www.hgs.org/eventSponsorship

Registration will open in April, 2018. Early bird rates will be available: check the HGS website for details.

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	Janet Combes	281-463-1564	jmcombes@msn.com	D2
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Applied Geoscience Conference

March 6-8, 2018

Integrated Approaches of Unconventional Reservoir Assessment and Optimization

Please join us for the Houston Geological Society's premier technical conference, offering the latest breakthroughs, technical perspectives and integrated approaches to unconventional reservoir assessment.

DAY 1

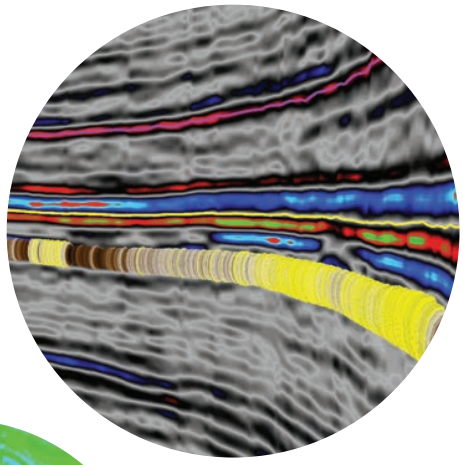
- **Session 1:** Diagenetic Components of Mudrocks and Their Impact on Production
- **Session 2:** Nanoscale Porosity and Hydrocarbon Phase Producibility / Wettability
- **Session 3:** Predicting petrophysical flow properties using digital rock physics
- **Session 4:** Geophysical Methods for Producibility, Fracability and GeoHazards

DAY 2

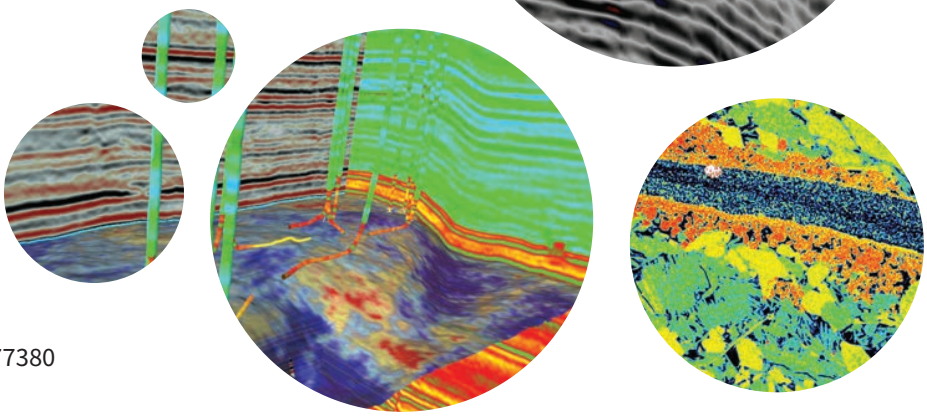
- **Session 5:** Analytical Applications for Improved Hydrocarbon Recovery
- **Session 6:** Hybrid Tight / Complex Opportunities
- **Session 7:** Technology Applications for Stimulated Rock Volumes Versus Drained Rock Volume
- **Session 8:** Operator Cases of Integrated Applied Geoscience for Fun and Profit

DAY 3

- **Workshop (separate registration):** Applied Methods of Core Descriptions to Maximize Value to an Operator (geared for the novice to the expert)



The full integrated industry member developed program includes the latest University Research (Poster Program Event), supporting Cores (Multi-Core event) and a Luncheon Keynote SME Speaker, as well as an first evening industry social.



Anadarko

ANADARKO CONFERENCE CENTER
1201 Lake Robbins Drive, The Woodlands, TX 77380

Registration Open!

For more information please visit: www.hgs.org

John A. Adamick
john.adamick@tgs.com

Got Time for Lunch (or Dinner)?

Happy New Year! As we roll out with the old 2017 and in with the new 2018, I thought I'd start this column with an assessment of the market conditions in our industry. At the time that I am writing this article, oil (WTI) is trading at $56.74 per barrel and natural gas is trading at $3.21/MMBtu. Of course, I have no idea what the trading price is on the day you read this article, but global projections range from a nearly balanced market to one that is slightly over-suppled in 2018. It certainly feels to me that market conditions are slowly improving. Hopefully that trend will continue as we move through the course of the year.

The main topic for this month's column is our technical lunch and dinner programs. When was the last time you attended an HGS lunch or dinner meeting? If it has been awhile you are missing out on an excellent opportunity to learn about the latest technical issues in our industry while also networking with your peers. The HGS has dozens of lunch and dinner meetings on a wide variety of topics throughout the year. We have a General Lunch Meeting downtown, a General Dinner Meeting on the west side and a Northsiders Meeting on the north side each month. The meeting topics are typically general in nature (as the name suggests), but are dispersed around town to make it easier for members to attend. There are also regularly scheduled meetings that focus specifically on International, Environmental and Engineering, and North American topics. Topic specific meetings are combined with general meetings from time-to-time when the talk is appropriate. HGS also has the NeoGeos gatherings that meet periodically and with salient geoscience talks of interest.

The HGS is always in search of quality technical content for our lunch and dinner meetings.

Presentations at HGS events are far-ranging and include topics as diverse as regional exploration, detailed case studies, new interpretation methods, geochemistry, water resources, oil and gas economics, space exploration etc. highlighting the broad range of interests of the HGS membership.

The HGS is always in search of quality technical content for our lunch and dinner meetings. If you have a good paper developed, or know of one, please share the information with us! HGS Vice-President **Bob Wiener** (rwiener@sbcglobal.net) will be more than happy to discuss the possibility of getting your paper into our technical program and published in the *Bulletin*.

If this is not enough to entice you to the meetings the HGS also has a Vendors Corner program. This program often provides members and vendors access to products or services that are aligned with the presented topic and provides another way to learn about various aspects of the business. All of the revenue generated from Vendors Corner is donated to the two HGS scholarship programs to help fund students through university. We also have recently added a Prospect Corner to the program where people marketing prospects can advertise them on the HGS website and have the opportunity to showcase them during the social hour at technical meetings. If you are a vendor or have prospects to sell, please contact chairman **Rich Germano** at fastenergydata.com for more information.

Sometimes you want to attend a talk but life gets in the way. If you are an HGS member, don't despair! The HGS video committee led by **Linda Sternbach** typically records presentations and makes them available on the HGS website under the "Education" tab. Or, you can go directly to: https://www.youtube.com/user/HGSGeoEducation/videos to review previously recorded talks.

I'd like to close my column today by recognizing two of our members who are active in developing HGS technical programs. **Donna Davis** and **Martin Cassidy** currently co-chair the North America Committee and are responsible for developing the technical program for that group. But, they do so much more than that! Donna has been active in the Society since 1986 and has served HGS as *Bulletin* Assistant Editor, as a member of the Continuing Education committee, as a judge at numerous events, as a member of the HGS-PESGB Africa Conference, and as a member and/or co-chair of the North American Committee since 2008. Martin has been an HGS member since 1966 and active in many ways. He has served on the Research Committee, the International Explorationist Group, and the HGS Africa Conference Committee. He has also has held the office of Treasurer, 2nd Vice President, and President of the Society. Both of these individuals have given their time to the HGS for many years and continue to do so in a significant way. Thank you both for your continued commitment to HGS! ■

AAPG

GLOBAL SUPER BASINS

27–29 March 2018
Hilton Americas • Houston, TX

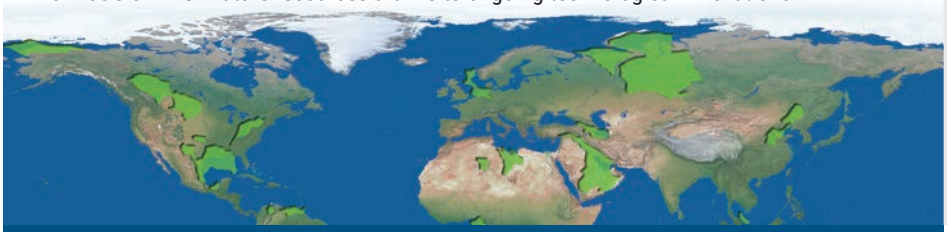
Leadership Conference

Actionable intelligence to profit from the world's most lucrative basins.

Whether you are an energy executive, investor, geoscientist, or consultant, this conference will give you the information you need to be successful in the world's most significant basins. The event will feature regional experts who will share their unique first hand knowledge of each of the globe's super basins.

What are Super Basins?

Super basins are the world's most richly endowed petroleum basins each with at least 5 BBOE produced and more than 5 BBOE left to produce. With multiple source rocks, multiple plays, and well-established infrastructure, the top 25 global basins hold potential for 100's of BBOE future resources thanks to ongoing technological innovations.



Basins From All Over the World!

- **Super Basins**, *Bob Fryklund, Pete Stark, IHS Markit*
- **Permian Basin**, *Scott Sheffield, Pioneer*
- **Overview of Greater Super Basin concept how it might evolve**, *Scott Tinker, Tinker Energy Associates, LLC*
- **Appalachian Basin**, *William A. Zagorski, Range Resources*
- **Anadarko Basin**, *Rick Fritz, Council Oak*
- **Going Beyond the North American Mudock Super Basin Plays: The Unconventional Development of Conventional Reservoirs**, *Richard K. Stoneburner, Pine Brook Partners*
- **Williston Basin**, *Mark Williams, Whiting Petroleum Corporation*
- **The Western Canadain Super Basin, a Confluence of Science, Technology, and Ideas**, *Paul MacKay, Shale Petroleum Ltd.*
- **California, San Joaquin**, *Kurt Neher, Berry Petroleum Company, LLC*
- **Alaska- North Slope**, *David Houseknecht, USGS*
- **Gulf of Mexico Offshore Evolution of Past, Present, and Future Plays**, *Cindy Yeilding, BP America*
- **Global Overview**, *Robert Ryan, Chevron*
- **Americas Unconventional Energy Opportunity – an update**, *David Gee, The Boston Consulting Group*
- **Mexico, Tampico Mizantla Basin and Sur Este Basin**, *Ivan Sandrea, Sierra Oil and Gas*
- **Neuquén Basin**, *Carlos Macellari, Tecpetrol*
- **North Sea**, *John Underhill, Heriot-Watt University*
- **The Arabian Basins: Prolific Producers with bright future still**, *Ibraheem Assa' adan, Saudi Aramco*
- **North Africa – a rejuvenated Super Basin**, *Jonathan Craig, Andrea Cozzi, ENI*
- **Brazil Pre Salt, Santos Basin**, *Mario Carminatti, Petrobras*
- **Western Siberia**, *Alexei V. Milkov, Colorado School of Mines, Vladimir Vyssotsky, BP Russia, Andrei S. Bochkov, GazpromNeft*
- **COP Operator Stimulated Rock Volume**, *Greg Leveille, ConocoPhillips*
- **Venture Capital Leading Edge Technology**, *Trond Unneland, Chevron*
- **Big Picture Geophysics and Reservoir Packages**, *Brian Horn, ION*

General Chair:
Charles Sternbach, *President, AAPG*

Learn more about this exclusive conference.

SuperBasins.aapg.org

Co-hosted by IHS Markit™

Brian W. Horn
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Accountability… A Path to a Fresh Start

It is 2018! All I can say is wow, where did last year go? In my endeavor to *finish strong* I began thinking about what I would like to accomplish both professionally and personally in the upcoming year. It seems this is the time of year I always plan on getting in better shape, reading more books etc., all different permutations of previous and mostly unrealized New Year's resolutions. So I am thinking of how I will start this next year differently. What should be my approach? Making changes in habits can be difficult and doing the same thing and expecting a different result is…insane. Somehow I still have been unable to get that message through my head. That's not to say I consider the events of 2017 a failure, because I don't. I experienced many great blessings at work and at home, hearty laughter, some tears and a few bits of whimsical thinking and pontification. I don't ever want look back on years past and wish for something different, pine away for the *good old days* or sulk because I didn't meet all of the goals I had wanted to achieve. Because what is in the past is just that, in the past.

Change is not easy. It requires a real commitment and dedication to the desired outcome. The difficulty is in the commitment to the process, which often is never seen and in some instances never started. There have been many times in my life when I have met people and marveled at their professional knowledge and acumen. I loved being around them as their passion and enthusiasm sparked a desire inside of me to be more like them. I found myself wanting to have similar characteristics, personality traits, technical wisdom or social graces. What I often overlooked was the hours of study, dedication and hard work these individuals had invested in order to achieve their present understanding, knowledge or financial and personal accomplishments. This became clear to me last week when I was corresponding with **Charles Sternbach** (AAPG President) regarding the upcoming AAPG Super Basins Meeting in March. I was traveling overseas and received a text message from Charles asking if we could chat. The caveat being it was 3:00 am Tulsa time! We spoke by phone and I must admit I was caught up in his enthusiasm and passion for the meeting. He had woken up and immediately started thinking about the conference. After our conversation I realized that successful people often make these kinds of personal sacrifices in order to promote something they truly believe in. The Super Basins Conference will be here in Houston in March and I would encourage everyone in HGS to attend.

So what will I do differently in 2018? For me accountability is the answer! When I was in college I lived with some friends and we committed to hold one another accountable to our words, actions and commitments. It sounds easy, but when my friends would inquire about particular issues often it quickly became obvious I had to *fess up* to the fact that I had not been faithful to my commitments or obligations. This was a humbling and motivating experience and it forced me to be more honest with myself about what I said I wanted and what it was I actually did.

It has been several years since that time and the flow of life often separates us from a setting of living in a community of friends. Fortunately, I still have many personal accountabilities (family and friends) as well as professional accountabilities (work, AAPG and HGS). However, accountability on a professional level has its own challenges as this requires us to surrender some authority to individuals we can trust. We must be open to their critique of the progress we have made and the counsel they give. Accountability is also a two-way street and the individuals we ask to help us achieve our goals must also commit to the responsibility in helping us accomplish our goals.

For my 2018 professional goals I would like to ask the HGS community to volunteer by holding me accountable. I promise I will not make a public list, that would not be appropriate and HGS members have more important things to do. But I will commit to this. If you see me around town or at a meeting please don't hesitate to inquire, "Brian, how are you progressing on your 2018 goals?" I promise to be honest with my reply and, if time allows I might share the particular issues at hand ask for advice on what I can do differently. I will welcome any and all feedback and I would be honored to have such a diverse group of advisors.

This next year can be truly amazing if we set our goals high, expect to succeed and remember that we are not in this by ourselves. I would encourage all of you to pick one or two things you would like to accomplish in 2018 and share them with your trusted advisors or mentors. Ask them if they would be honored to accept the responsibility to hold you accountable in accomplishing those goals. Not in a legalistic fashion, but in an way that is encouraging, honest and spurs each of us on toward what we truly want to accomplish in 2018.

Applied Geoscience Conference

March 6-8, 2018

Integrated Approaches of Unconventional Reservoir Assessment and Optimization

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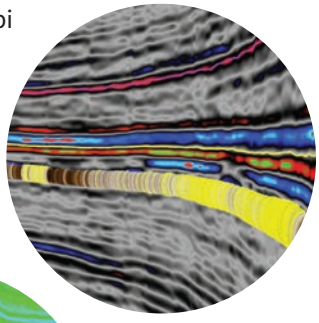

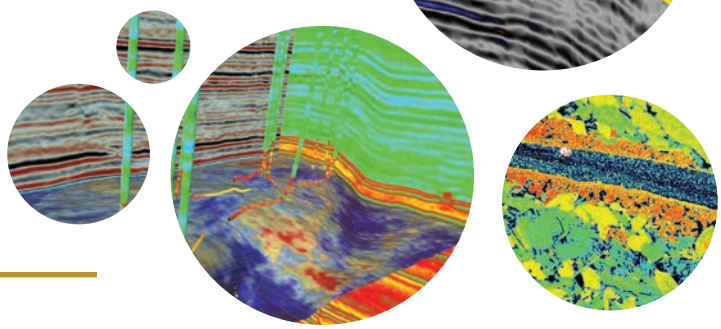

Anadarko

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For more information please visit: www.hgs.org

Applied Geoscience Conference

March 6-8, 2018

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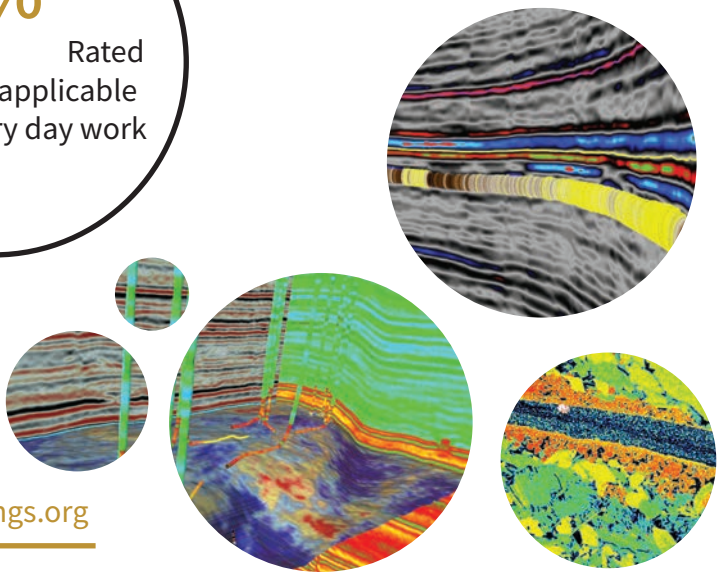
91% Rated the talks as applicable to their every day work



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Applied Geoscience Conference

March 6-8, 2018

Oral Presentations – Tuesday, March 6, 2018

7:00	**Registration and Coffee**	
8:00 - 8:10	**Welcome and Opening Remarks:** Frank Walles, *Baker Hughes, a GE company*; John Adamick, *TGS, HGS President 2017-2018*	
	Session 1: Diagenetic Components of Mudrocks and Their Impact on Production **Chairs:** Tina Calvin, Wayne Camp and Ian McGlynn	
8:10 - 8:45	Quartz Cementation in Mudrocks: How Common Is It	**Kitty Milliken**, *Bureau of Economic Geology, The University of Texas at Austin*
8:45 - 9:20	Organic Diagenesis (Artificial Thermal Maturation Studies) – Pyrolysis with SEM Observations	**Bobby Hooghan,** *Weatherford Laboratories;* **Lori Hathon,** *University of Houston*
9:20 - 9:55	Fluid Inclusion Technology Applications for Mudrock Petroleum Source Rocks	**Don Hall**, *Fluid Inclusion Technologies, a Schlumberger Company*
9:55 - 10:20	**Coffee, Posters, Exhibits**	
	Session 2: Nanoscale Intra-Kerogen Porosity and Hydrocarbon Phase Producibility/Wettability **Chairs:** Avrami Grader, James Macquaker and Steve Geeten	
10:20 - 10:55	Reservoir Quality of the Middle Bakken Controlled by a 300 Ma History of Carbonate Cementation and Dolomitization	**Andy Applin**, *Durham University;* M. Brodie, J.W. Valley, I.J. Orland, B.S. Hart
10:55 - 11:30	Reservoir Characterization and Modeling to Determine the Mechanisms Controlling Enhanced Oil Recovery from Tight Oil Formations – A Bakken Case Study	**James Sorenson,** *EERC;* Steven Hawthorne, Larry Pekot, Beth Kurz, Lu Jin, Jose Torres
11:30 - 12:30	**Lunch, Posters, Exhibits**	
12:00 - 12:30	**Keynote:** Water Resource Issues within Unconventional Resource Development in the Permian Basin	**Dr. Bridgett Scanlon** *The University of Texas*
	Session 3: Predicting Petrophysical Flow Properties Using Digital Rock Physics **Chairs:** Timothy Diggs and Terry Hagiwara	
12:30 - 1:10	A Digital Rock Investigation of the Role of Knudsen Number for Flow in Unconventional Reservoirs	**Juan Bautista**, *EXA Corp.*
1:10 - 1:45	Multi-Phase Fluid Imbibition, Distribution and Wettability in Shale through Synchrotron Based Dynamic Micro-CT Imaging	**Sheng Peng**, *Bureau of Economic Geology, The University of Texas at Austin*
1:45 - 2:20	A Multiscale Study of Fluid Flow in Mudrock Systems	**Farzam Javadpour,** *Bureau of Economic Geology, The University of Texas at Austin*
2:20 - 2:45	**Coffee, Posters, Exhibits**	
	Session 4: Geophysical Methods for Producibility, Fracability and GeoHazards **Chairs:** Lisa Neelen and Shon Bourgeois	
2:45 - 3:20	Simultaneous Joint Inversion of Converted Wave Seismic Data for Improved Reservoir Characterization (Oklahoma)	**Pete Christianson, Magdy Ghattas, Robert Hu,** *Marathon*
3:20 - 3:55	Recognition and Risk Assessment of Dissolution Karst within Permian Evaporites, Delaware Basin, Texas	**Alan Morgan,** *Bell Geospace*
	Closing Comments and Invitation to Posters and Core Sessions	
4:15 - 8:00	**Social Hour**	

Applied Geoscience Conference

March 6-8, 2018

Oral Presentations – Wednesday, March 7, 2018

7:00	**Registration and Coffee**	
8:00 - 8:10	**Welcome and Opening Remarks:** Frank Walles, *Baker Hughes, a GE company*	
	Session 5: Analytics Applications for Improved Hydrocarbon Recovery **Chairs:** Andrew Silver and Brian Velardo	
8:10 - 8:45	Answering Specific Managerial Completion Questions: More Production for Less Money	**Dr. Richard Batsell,** *Rice University*
8:45 - 9:20	The Abuse of R^2: How Correlation Statistics are Misunderstood and Misused (Illustrated Using O&G Data)	**Andrew Silver,** *Repsol*
9:20 - 9:55	TBD	TBD
9:55 - 10:20	**Coffee, Posters, Exhibits**	
	Session 6: Hybrid/Tight/Complex Opportunities **Chairs:** Obie Djordjevic and Barbara Hill	
10:20 - 10:55	The Vaca Muerta Play (Neuquen Basin, Argentina). A Case Where Bentonites Help to Assess Early Development Areas, Predict TOC and Quantify Lateral Facies Variations.	**Daniel Minisini,** *Shell;* **John Breyer**, *Marathon*
10:55 - 11:30	Depositional Interpretation and Sequence Stratigraphic Control on Reservoir Quality and Distribution in the Meramec STACK Play: Anadarko Basin, Oklahoma	**Buddy Price**, A. Pollack, A. Lamb, *Devon Energy*
11:30 - 1:00	**Lunch, Posters, Exhibits**	
	Session 7: Technology Applications for Stimulated Rock Volume Versus Drained Rock Volume **Chairs:** Luis Baez and Eric Michaels	
1:00 - 1:35	Accelerating Completions Concept Select in Unconventional Plays Using Diagnostics and Frac Modelling	**Jim Brewer,** *Shell*
1:35 - 2:10	Time-lapse Geochemistry (TLG) Application in Unconventional Reservoir Development	**Eric Michael,** *ConocoPhillips*
2:10 - 2:45	TBA	*TBA*
2:45 - 3:15	**Coffee, Posters, Exhibits**	
	Session 8: Operator Cases of Integrated Applied Geoscience for Fun and Profit **Chairs:** John Breyer and Raj Malpani	
3:15 - 4:15	Permian Basin Wolfcamp: Field Development, Critical Data Acquisition, Integration & Workflow	**Phil Lindner, John Ndungu,** *Pioneer*; Kyle Scott, Omkar Jaripatke, Hector Bello, Weichun Chu, *Pioneer Resources*
	Closing Comments and Invitation to Posters	

Poster Session

Invited Presentations from Graduate Students

Open during Coffee and Lunch Breaks

Applied Geoscience Conference

March 6-8, 2018

Posters – March 6-8, 2018

Poster Session Chair: Mike Effler

University	Student Name	Poster Topic
Oklahoma State University	**Michele Abshire**	The Uranium/TOC Conundrum of Black Shales: What Gamma-Ray Logs Might Miss
Oklahoma State University	**Yulun Wang**	Natural Fractures and Their Relationship to Facies, Sequence Stratigraphy, and Rebound Hardness, the "Mississippian Limestone" Play, North-Central Oklahoma, U.S.A
Texas A&M University	**Telemachos Manos**	Thermal Maturity Modeling of Organic-Rich Mudrocks in the Delaware Basin using Raman Spectroscopy of Carbonaceous Material
Texas A&M University	**Roy Conte**	Integrating Core, Wireline Log and Chemostratigraphic Data with Biostratigraphic Data and High Resolution U-Pb Zircon Geochronology to Determine Timing Constraints on the Eagle Ford Group Depositional Processes and Stratigraphy
Texas A&M University	**Sergey Parsegov**	Micromechanics of Mudstones. Cost Effective Measurements
The University of Oklahoma	**Pritesh Bhoumick**	Mapping Hydraulic Fractures Propagation using Polarized Shear Wave
The University of Texas of the Permian Basin	**Fatimah Adelekan**	Integrated study of the Wolfcamp Debris Flow, Delaware Basin, Texas to Determine the Depositional Environment, Sequence Stratigraphy and Petrophysical Analysis: Case Study – Mendel Field
The University of Texas of the Permian Basin	**Joanna Walker**	A New Approach to Fracture Identification within the Wolfcamp Formation of the Delaware Basin By Means of Dispersion from Refracted Shear
University of Alberta	**Noga Vaisblat**	Rock Fabric, Rock Composition, and Reservoir Quality in the Montney Formation, Western Canada
University of Calgary	**Emma Percy**	Calcareous Organic-Rich Mudstone Depositional Processes on a Low-Gradient Ramp, Example from the Turonian Second White Specks Formation, West-Central Alberta, Canada
University of Houston	**Zohreh Souri**	Identification of Sweet Spots for Hydraulic Fracture in Avalon Shale, Permian Basin, Using Lithofacies Classification
University of Kansas	**Jeff Jennings**	Identifying at Risk Areas for Injection-Induced Seismicity Through Subsurface Analysis of the State of Kansas

Participating Schools

Oklahoma State University • Texas A&M University • The University of Oklahoma

The University of Texas • University of Alberta • University of Calgary • University of Houston

Open During Coffee and Lunch Breaks

Wednesday, January 10, 2018

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.

Derek Blanchard
Derek Blanchard Content

ETHICS MOMENT

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

Tell a Story with Purpose – Importance of Powerful Messaging in 2018

Geologists are natural storytellers and creative problem solvers. In 2018, powerful storytelling is more important than ever. Whether creating your brand, pitching to stakeholders, or posting on social media, you must be a powerful storyteller. The digital world doesn't move fast, it moves at lightning speed! Today almost every person has access to a digital camera. A child can pick up a phone, and edit a polished video with music and titles. But what separates the average person from what you must do is telling your story with purpose. Derek's talk will cover his approach to impactful video making and the importance of brand messaging in the modern world. ■

Biographical Sketch

Derek Blanchard is the founder of Derek Blanchard Content, a digital marketing company that specializes in brand storytelling. He is a digital photo and video expert with a mission of "telling stories with a purpose". He has worked with organizations such as AAPG, Moroch Partners, ET Media and countless oil and gas forums at home and abroad.

He graduated with a BFA in Film & Television from AAU in San Francisco and has created documentaries and advertisements around the world in places like Turkey, Kenya, Syria, and the UAE. Derek grew up in the Middle East as an oil and gas kid. After turning away from his destined path in the industry to become a filmmaker the oil and gas industry pulled him right back in to do what he loves.

The Houston Geological Society Continuing Education Committee Presents

Applied Methods of Mudstone Core Description and Interpretation

A One-Day Short Course
by Dr. Ursula Hammes and Dr. Kirk Campion
Thursday, March 8, 2018 • Anadarko Petroleum Grogans Mill Core Facility, The Woodlands, TX

The Houston Geological Society is pleased to announce a new continuing education seminar titled "Applied Methods of Mudstone Core Description and Interpretation" held in conjunction with the Applied Geoscience "Mudrocks" Conference on March 8, 2018 at the Anadarko core facility in The Woodlands, Texas.

The one-day seminar is intended for geologists of all experience levels interested in improving their skills in identifying and interpreting physical sedimentary structures, and recognizing vertical stratigraphic relationships observable from conventional full-diameter slabbed cores. Participants will learn how to identify key sedimentary features in a stratigraphic context necessary to describe mudstone facies at a practical scale to tie to well logs for improved reservoir characterization and mapping.

The full-day course will consist of introductory lectures followed by hands-on core examination guided by the instructors Dr. Ursula Hammes and Dr. Kirk Campion. A wide variety of productive shale and tight oil and gas reservoirs will be examined from the following formations: Bakken, Woodford, Mississippian Lime, Haynesville, Eagle Ford and Marcellus.

Class size is limited, so register early.

Date: Thursday, March 8, 2018

Please make your reservations on-line www.hgs.org

For more information about this event, contact HGS Office 713-463-9476 • office@hgs.org

Dr. Hammes obtained her Diploma at the University of Erlangen, Germany, and her PhD at the University of Colorado at Boulder. Her graduate studies specialized in carbonate depositional environments, sequence stratigraphy, carbonate diagenesis, and rock-water interactions. Her background is diverse ranging from exploration, exploitation and business development for Anadarko Petroleum, consulting for energy companies, conducting research in Texas and the Gulf of Mexico as researcher and Principal Investigator of $3+ million projects for the State of Texas Advanced Resource Recovery project, and conducting research and advising students at the University of Potsdam (sabbatical 2011-2013), Bureau of Economic Geology, The University of Texas at Austin (2000-2016), and Texas A&M University (2016-Recent).

Dr. Hammes served as president of the Gulf Coast Section of SEPM (GCSSEPM), currently assists as associate editor for the AAPG *Bulletin*, and has been chair of many AAPG conventions and sessions. Her research interests range from mudrock analyses to clastic and carbonate sequence stratigraphy and sedimentology. Her recent research objective is in shale-gas/oil systems specializing in basin to nano-scale characterization of shale basins. She has published extensively in recognized sedimentologic and petroleum industry professional journals.

Kirt Campion worked as a senior stratigrapher at Marathon Oil Company from 2008 until his recent retirement in 2017. Prior to working at Marathon, he worked at Exxon Production Research Company and ExxonMobil Upstream Research Company for 29 years as a clastic sedimentologist and sequence stratigrapher. Kirt completed his undergraduate studies at the University of Wisconsin and did graduate work at the University of Nebraska (MS in 1974) and Ohio State University (PhD in 1979). His research interests are in sequence stratigraphy and deep-water stratigraphy. Kirt has worked with core data from various basins around the globe including unconventional systems from the Bakken Formation in North Dakota, Woodford Formation in the Anadarko Basin, Oklahoma, Eagle Ford in Texas, Ordovician and Silurian in Poland, and siltstones from the Spraberry in the Permian Basin. Among the conventional systems, Dr. Campion has worked on core data from the Gulf of Mexico, Western Interior basin, South American basins, the North Sea, and West Africa. Kirt has been an active member of AAPG and SEPM for over 40 years. He has published several papers on sequence stratigraphy and on deep-water stratigraphy in California and Chile. He has guided field trips to a number of localities in California and Utah for AAPG, SEPM and GSA. Kirt's main hobbies are kayaking around Precambrian outcrops rimming Lake Superior and trying to behave as a passionate soccer fan. He is currently a consultant in the Houston area.

Monday, January 22, 2018

New Location
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.

David Kosmitis
Talos Energy LLC
Michael C. Dix, Iain Drew, Weatherford
Mike Albertson, Thomas Hall, John Parker, Talos Energy LLC
Mark G. Rowan, Rowan Consulting, Inc.

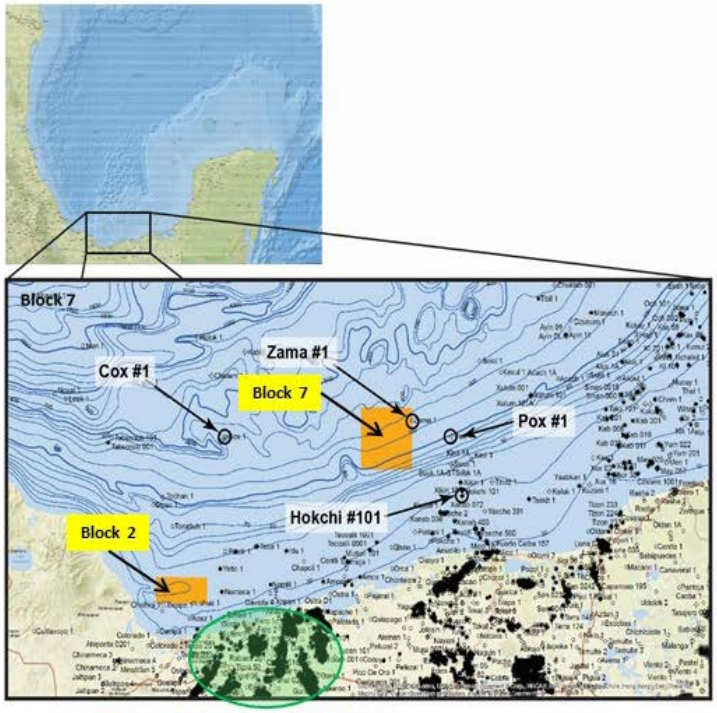
The Zama Discovery in Salina del Istmo Basin, Offshore Tabasco: "New Dawn" for Offshore Mexico Exploration

The Talos Energy Zama #1 well was the first private-sector exploration well operated in Mexico in 78 years, was drilled in May-July of 2017 in Block 7, offshore Tabasco in 166m water. The Zama structure was identified prior to the leasing round using 3D narrow-azimuth seismic data, and consists of an upthrown fault block with three-way closure on the flank of a salt structure in the eastern Salina del Istmo basin. A gross sandstone reservoir interval of 344 meters was penetrated, containing 29.6º API oil. The estimated reserves make Zama one of the most significant offshore discoveries globally in several years.

An array of tools and techniques was used to define, drill, and evaluate the Zama prospect. These include: 1) pre-drill AVO analysis calibrated to seismic data using existing well control, 2) structural and stratigraphic analysis to frame the prospect in

HGS Joint Dinner *continued on page 17*

- **Zama #1 is the first true exploration well drilled by a private company in over 70 years (circa 1938) and is believed to be the first offshore exploration well ever drilled in the history of Mexico by a private company.**
- **Zama #1 drilled in Block 7 located 49 km (30 mi) offshore Mexico Water depth: 160 m (545').**
- **Partners WI: Talos (Operator) 35% Sierra 40% and Premier 25%**
- **Zama #1 is a true wildcat with the closest well penetration the Pox #1 located 17 km (10.5 mi.) to the ESE. The Cox #1 which served as the stratigraphic control is located 72 km (45mi.) to the west.**
- **Closest oil field Hokchi Middle Miocene (Panamerican) is located 34 km (21 mi.) SE.**



Upstream Oil & Gas Professionals Hiring Event

March 27, 2018 • 10am to 3pm
Trini Mendenhall Community Center • 1414 Wirt Rd., Houston, TX 77055
http://www.pct3.com/community-centers/mendenhall-community-center/

The Members-in-Transition committee invites you to participate in the third edition of the Upstream Oil and Gas Professionals Hiring Event. Following the success of the March 2017 inaugural event we continue to provide a platform for connecting experienced job seekers with oil and gas companies with open positions.

Job Seekers: Around 40 companies are expected at the Hiring Event! Meet with employers hiring for professional upstream positions. Stay tuned for registration details and upcoming guidance sessions to help you maximize your success at the Hiring Event.

Employers: A booth at the Hiring Event presents an ideal opportunity to fill your job vacancies while providing valuable exposure for your company. Hundreds of high-quality experienced individuals in the upstream oil and gas industry are expected to attend.

Sponsors: Sponsorship for the Hiring Event will help build your name, image, and pride by supporting an event that helps fuel and sustain the oil & gas industry in the Gulf Coast section.

Collaborating Organizations: Professional organizations with a common interest to support their members during career transitions can provide value to their members by participating in the Hiring Event.

Event Contact Info: Bob Merrill and Ramesh Anand, Co-chairs. spegcs.mit.hiringevent@gmail.com 713-409-7340/281-403-6070

PRICING
Employer: Pricing is based on number of employees. Less than 50 = $100; between 51 and 1000 = $500; more than 1000 = $1000
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Job Seeker: registration fee of $5 opens February 23, 2018

SPE Registration Link:
Employer: https://www.spegcs.org/events/3829/
Job Seeker: Job Seeker registration opens February 23, 2018

continued from page 15

proper context, 3) petrophysical analysis using XRD mineralogy and image logs, 4) forward modeling for pre-drill stratigraphic control and reservoir thickness, 5) a full suite of LWD and wire line logs (including elemental spectroscopy, formation pressure testing, and fluid sampling), 6) combined biostratigraphic and petrologic (XRD and XRF) analyses performed on cuttings while drilling, and PVT analysis.

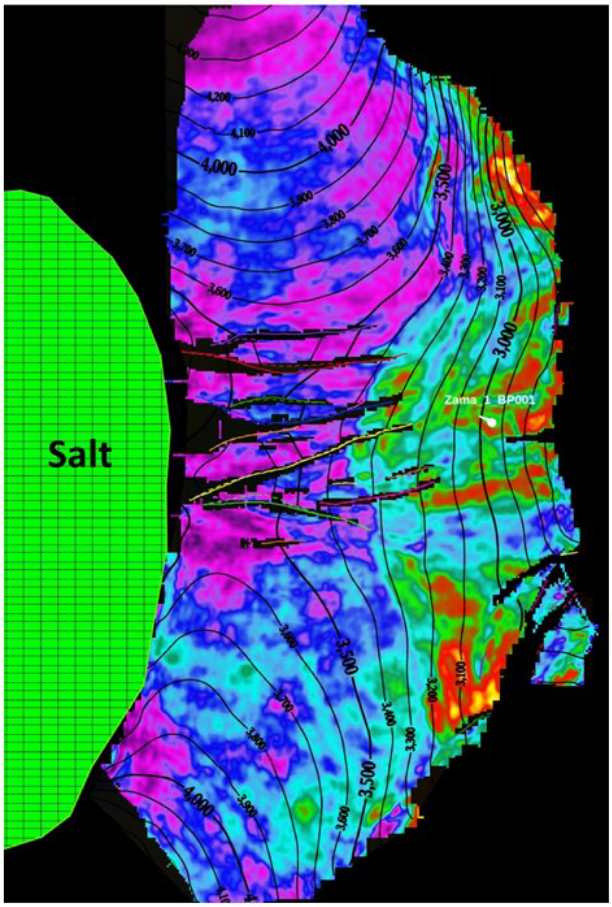
The reservoir section is dominated by amalgamated, very fine-grained to fine-grained, highly feldspathic, consolidated sandstones with low clay and carbonate content. Structural mapping and biostratigraphy suggest sediment may have been fed from a focused entry point into an evolving Late Miocene mini-basin and deposited as a confined slope-fan complex. The base of the reservoir section coincides with a significant unconformity related to salt tectonics. XRF elemental chemostratigraphy recognized 20 zones within the overall Oligocene-Pleistocene section, largely driven by changes in heavy mineral and clay composition. Distinctive elemental changes occur across the base-of-reservoir unconformity, while more subtle variations appear useful for intra-reservoir subdivision. After pressure-gradient data confirmed only one hydrostatic system in the reservoir, a fluid sample was acquired. Wellbore conditions precluded acquisition of cores, so there is still much to learn about the details of the Zama reservoir.

With the success of this integrated approach, the Zama #1 discovery has thus far lived up to its Mayan namesake, "City of Dawn", and hopefully signals a new era for exploration in Mexico. ■

Biographical Sketch

David Kosmitis has 35 years of exploration and development experience in various basins in the Gulf Coast of North America and seven countries around the world. His efforts have produced numerous discoveries in both clastic and carbonate environments. His primary efforts have been historically focused on prospect generation and development utilizing the full integration of geological and geophysical data. He has a Bachelor of Science in Geology from Memphis University. dkosmitis@talosenergyllc.com

- **Zama #1 was drilled to 4,109m (13,480') to test a three-way up thrown fault trap consisting of a series of stacked Upper Miocene amplitude anomalies that exhibit a "common" termination in the down-dip direction with good AVO.**
- **The well encountered 341.3 meters (1,120') of oil in Upper Miocene Sands.**
- **The total productive area is 12.9 square kilometers (3,200 acres).**
- **Estimated reserves of oil in place 1.4 to 2.0 billion barrels.**



Wednesday, January 24, 2018

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

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.

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Daniel M Jarvie
TCU Energy Institute

Petroleum Systems in the Permian Basin: Targeting Optimum Oil Production

Identifying different completion targets is dependent on innumerable factors, but this presentation focuses on geochemical factors. Tight oil hybrid systems such as found in the Permian basin have inter- and intra-formational targets. The source rock itself is usually a target as are juxtaposed organic-lean intervals as well as conventional reservoirs.

Conventional pay zones are often over-looked or bypassed and unconventional plays were entirely bypassed until the Mitchel Energy breakthroughs in completing the Barnett Shale and subsequent application of completion and horizontal drilling technologies. While these open the door for drilling such tight oil systems, identifying the optimum zones for completion remain a challenging task.

Production from shales is not a new phenomenon. It has been ongoing for over 100 years, albeit from open fractured shales. Reservoir stimulation and horizontal drilling is not new to shale plays. This kind of drilling was used in the Upper Bakken Shale in the 1980s-90s. What is different is the ability to complete tight oil horizons effectively with impressive recoveries.

The first unconventional well attempted in the Permian basin was drilled in 2005 for shale gas in Reeves County, Texas. The vertical well tested the Barnett Shale and flowed minor amount of gas (50,000 scf/d) and a few barrels of condensate per day. The location of the well was determined to be in the middle oil window. Further drilling of deeper wells at significantly higher thermal maturities resulted in production of high volumes of gas. With low gas prices in 2007 a shift was made to tight oil plays.

There are several petroleum systems and tight oil plays in the Permian basin. They vary by age, maturity, source rock type, and play type (conventional vs unconventional). Analysis of over 500 oils and 2500+ rock samples has allowed further delineation of the Permian basin petroleum systems. The source rock systems with organofacies are listed in **Table 1**.

A key advantage of geochemical analysis is that the actual produced petroleum is evaluated and not inferred. The source rock type, thermal maturity and related composition of petroleum (bitumen) are geochemical factors affecting

- Permian Guadalupian (3)
- Permian Leonardian Bone Springs (2)
- Permian Spraberry
- Permian Wolfcampian (2)
- Pennsylvanian (3)
- Mississippian Barnett Shale
- Devonian-Mississippian Woodford Shale (2)
- Ordovician Simpson Formation (2)

Table 1. *Permian basin source rock intervals with number of units or organofacies in parenthesis based on work of Williams (1977), Katz et al. (1994), Jarvie et al., (2001), Hill et al. (2005), and Curtis and Zumberge, 2017.*

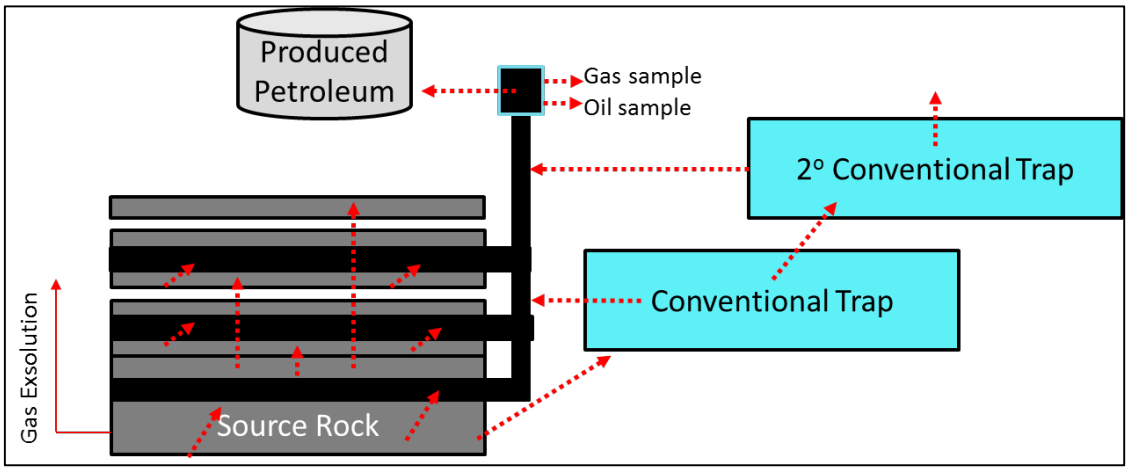

Figure 1. *Petroleum expulsion, migration, and production results in fractionation of petroleum. The interaction of petroleum with organic matter and rock matrices results in changes in the composition found in juxtaposed or in longer distance migration to conventional traps. Production also results in fractionation.*

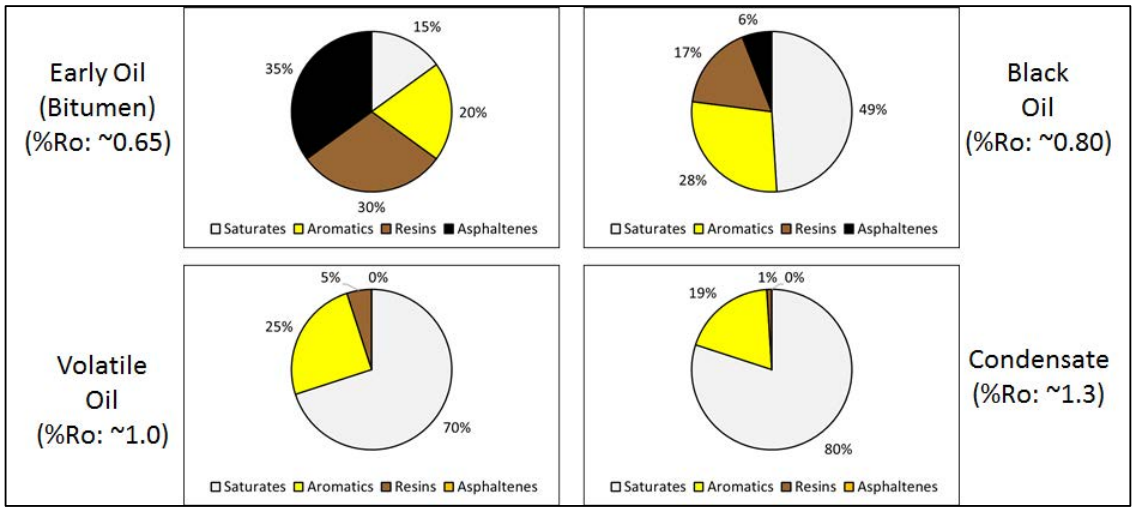

Figure 2. *Petroleum resins cracking in the oil window results in higher amounts of saturated hydrocarbons and higher API gravity.*

producibility. In addition, petroleum composition varies by expulsion, migration and production resulting in fractionation of petroleum (**Figure 1**).

Fractionation of petroleum can be observed in the changes of SARA composition (Saturates, Aromatics, Resins, Asphaltenes). These fractions have different chemical properties and differ in polarity. In black oil maturity tight oil plays the SARA composition affects recovery of petroleum. Resins and asphaltenes are viscous, high polarity constituents that occlude pore throats by affecting wettability. This is exacerbated in higher TOC systems where the thermal maturity is in the black oil window.

The polar constituents (resins and asphaltenes) also affect wettability. Such compounds have ability to interact with water-wet surfaces as a result of hydrogen bonding enhanced by the presence of sulfur and oxygen. As these polar compounds interact with water wet surfaces they occlude pore throats. These polar compounds are in higher concentration in marine carbonate as compared to marine shale source rocks. At high thermal maturity these compounds crack yielding higher amounts of saturated hydrocarbons and increased API gravity. This is demonstrated by data showing the yield of saturates increasing with the simultaneous decrease in resins and increase in API gravity (**Figure 2**). Similarly the presence of intervals with high resins and asphaltenes may act as baffles to stimulation.

HGS General Luncheon *continued on page 20*

HGS General Luncheon continued from page 18

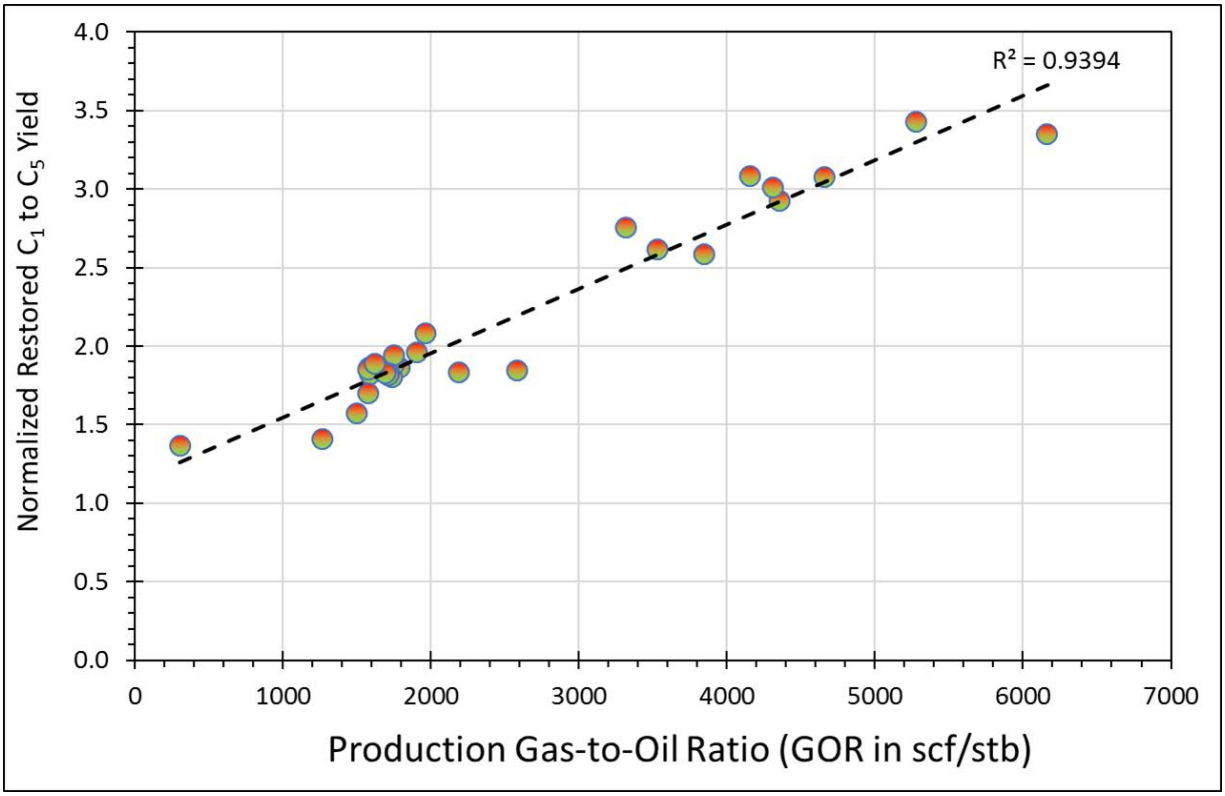

Figure 3. *Correlation of restored gas yields from a normalized and restored gas yield derived from a gas chromatographic (GC) fingerprint to initial production GOR.*

One of the key characteristics for a good return-on-investment in a tight oil play is the determination of the volatile oil window and the yield of petroleum liquids in the early gas window. While many techniques are available for maturity assessments, one of the most accurate and reproducible techniques is quantitative aromatic hydrocarbon analysis (Hill et al., 2004; Rocher et al., 2015). Using this technique the determination of specific oil and gas windows may be determined such as black oil from volatile oil and condensate windows as well as the rich and lean, wet gas and dry gas windows. This technique can be utilized on rocks samples and oils so a specific correlation between rock and petroleum properties can be made when both are available.

Restoration of the "lost" oil content in either a dead oil or from oil extracted from a rock sample allows better estimate of the total oil content in a reservoir compared to measurements made by Rock-Eval S1 oil yields. Holba et al. (2014) have used this to predict oil API gravity from rock extracts. The slope of the unevaporated normal alkanes can be extrapolated and represent restoration of the total petroleum. This allows estimation of the amount of petroleum lost due to evaporation and added to the measured oil content for the total oil content. This restoration process also allows prediction of oil quality such as API and GOR (**Figure 3**). ■

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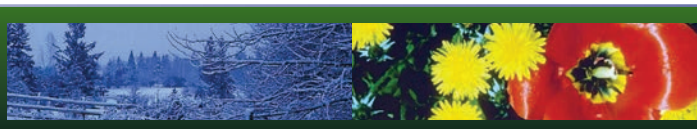
Biographical Sketch

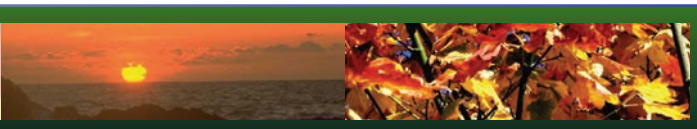
Dan Jarvie has worked in the field of organic geochemistry since 1982 in various positions in laboratories and data interpretation.. His early work was focused primarily on instrumentation and laboratory analyses. He has specialized in assessment of unconventional shale resource system over the last two decades. He founded and was president of Humble Instruments and Humble Geochemical Services from 1987 to 2007, which were sold to Weatherford in 2007. Dan served as Chief Geochemist for EOG Resources, Houston, Texas until April 2015. Currently he is working the onshore Tampico-Misantla basin, Mexico for Renaissance Oil and has various pro bono research projects underway.

Dan served in the U.S. Navy from 1968-1974 and graduated from the University of Notre Dame in 1976. He was mentored in organic geochemistry by Wallace Dow and Don Baker of Rice University. He is an adjunct professor at TCU and a member of the scientific board for TCU's Energy Institute. His residence has been on top of the Humble Salt Dome since 1981.

January 2018



Sunday	Monday	Tuesday	Wednesday
	1	2	3
7	8	9 **HGS Board Meeting** *6 p.m.*	10 **HGS Environmental & Engineering Dinner Meeting** *"Tell a Story with Purpose – Importance of Powerful Messaging in 2018" Derek Blanchard* *Page 13*
14	15	16	17
21	22 **HGS General, International and North American Dinner Meeting** *"The Zama Discovery in Salina del Istmo Basin, Offshore Tabasco: "New Dawn" for Offshore Mexico Exploration," David Kosmitis* *Page 15*	23	24 **HGS General Luncheon Meeting** *"Petroleum Systems in the Permian Basin: Targeting Optimum Oil Production," Daniel M Jarvie* *Page 18*
28	29	30	31



GeoEvents

Thursday	Friday	Saturday
4	5	6
11	12	13
18	19	20
25	26	27

Don't wait, make your reservations online at hgs.org

Reservations:

The HGS prefers that you make your reservations on-line through the HGS website at www.hgs.org. If you have no Internet access, you can e-mail office@hgs.org, or call the office at 713-463-9476. **Reservations for HGS meetings must be made or cancelled by the date shown on the HGS Website calendar, normally that is 24 hours before hand or on the last business day before the event**. If you make your reservation on the Website or by email, an email confirmation will be sent to you. If you do not receive a confirmation, check with the Webmaster@hgs.org. Once the meals are ordered and name tags and lists are prepared, no more reservations can be added even if they are sent. **No-shows will be billed.**

Members Pre-registered Prices:

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

March 6-8, 2018
HGS Applied Geoscience Conference
Integrated Approaches of Unconventional Reservoir Assessment and Optimization
The Woodlands, TX (Page 4)

April 27-29, 2018
Take a kid to the outcrop family campout
Camp Cullen YMCA
Trinity, TX

September 11-12, 2018
The 17th HGS-PESGB Conference on African E&P
Houston, TX (Page 2)

Microbial Carbonates in Central Texas Field Trip

Microbes are defined as microorganisms visible only under a microscope. Some examples are bacteria, fungi, molds, algae, and protozoa. Microbial sediments have always attracted the attention of sedimentologists and paleontologists, but in recent years the discovery of large oilfields in microbial carbonate reservoirs has generated renewed interest in these rocks, especially in the environments in which microbial carbonates form and the characteristics that make them good reservoirs. What used to be classified as "algal" is now classified as microbial or calcimicrobial. The older classification of living things that included kingdoms of animals and plants has been supplanted by a scheme that puts all living things into three main branches called "domains" of life – Bacteria, Archaea, and Eukarya. Bacteria, including cyanobacteria, and Eukarya, red and green algae and fungi, are the principal "actors" involved in the formation and diagenesis of microbial carbonates.

March 22 – 25, 2018
Limited space for 23 participants!
Registration opens in January 2018
Trip Leader: Dr. Andre Doxler,
Rice University Professor

Most microbial sediments and rocks are carbonates. Some of the most spectacular examples are found in Upper Cambrian carbonates of Central Texas – microbial buildups and associated facies in the Point Peak and San Saba members of the Wilberns Formation. Point Peak and San Saba outcrops in Central Texas expose some of the best preserved Cambrian microbial carbonates anywhere. These microbial limestones have not been tectonized and their depositional fabrics and textures have been remarkably well preserved with only minor dolomitization in some stromatolitic and oolitic facies. Thin section study of the microbialites reveals four different calcimicrobes; Girvanella, Epiphyton, Renalcis, and Nuia.

Point Peak and San Saba rocks outcrop around much of the Llano Uplift (a structural dome with its cover removed to form a topographic basin). The best exposures are in the western part of the area in Gillespie and McCulloch Counties, extending from the Doss settlement in the southwest to the San Saba River in the north. Because it is not always easy to get access to outcrops on private land in the Texas Hill Country, this field trip takes advantage of excellent exposures along segments of the Llano and San Saba Rivers, where we have access. The Llano River portion of our trip will be done from kayaks making it even more interesting and exciting.

One day of the trip will be by kayak, starting at White's Crossing near Mason, Texas. We will see famous exposures of microbial buildups in the Point Peak Member, Wilberns Formation. As we paddle downstream, we will have close-up views of microbial bioherms that have fallen into the river from the surrounding cliffs. As we pass gradually up-section through the Point Peak, we will have a chance to get out on the riverbank to see a variety of sedimentary structures, including mud cracks and flat-pebble conglomerates, some of which are "edgewise" conglomerates formed by strong eddy currents that spun the flat pebbles into accumulations that look like "pinwheels." Our lunch stop will provide an opportunity to walk over a continuous exposure of stromatolitic and thrombolitic microbialites. After lunch we will see microbial bioherms with superb stromatolite accumulations at water level. This location offers a chance for close-up photos of stromatolites in cross-section. As we near the end of our float, we will be passing out of the Point Peak and through the San Saba Member of the Wilberns Formation.

The second day of the trip includes an excursion to the US Highway 87 crossing on the San Saba River. After arriving by car, we will walk along the river on both sides of the bridge to examine large ripple marks in grainstones of trilobite-brachiopod hash and microbial bioherms in vertical succession, some with well-developed stromatolitic "capping sequences" as well as thrombolitic and laminar macrostructures that are present at this location. ■

Government Update

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

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

AGI Geoscience Policy Monthly Review (September 2017)

Bipartisan Legislation Introduced to Curb Carbon Pollution

Representative Mike Conaway (R-TX-11) led a bipartisan coalition of 29 members to reintroduce the Carbon Capture Act (CCA) (H.R.3761) on September 14, 2017. This legislation incentivizes Carbon Capture and Sequestration (CCS) projects, which use technologies to capture up to 90 percent of carbon dioxide (CO_2) emissions produced from industrial processes, including electricity generation.

The CCA would increase the value of existing tax credits to provide $35 per ton of CO_2 for qualified proposals. The CCA would also permit other types of CCS projects, such as those directly capturing CO_2 from the air, and would include smaller facilities producing no less than 100,000 metric tons of CO2 annually. Currently, tax credits award $10 per ton of stored industrial CO_2 used in oil recovery and $20 per ton on CO2 stored in underground reservoirs.

According to Representative Conway, the bill is an opportunity to move America towards energy independence while reducing carbon emissions from traditional fuel sources by encouraging the use of CCS technologies. Supporters of the CCA believe that the current benefits under Section 45Q of the tax code is not sufficient to finance CCS projects and is set to expire. However, some groups in opposition to the bill fear that it might trigger more carbon emissions than are captured. Oil Change International released a statement indicating that this legislation would be worth up to $4.5 billion per year, making it the "largest single federal handout" to the fossil fuel industry.

The CCA is a companion to the FUTURE Act (S.1535), introduced in the Senate on July 12 by Senator Heidi Heitkamp (D-ND), which also aims to amend the Internal Revenue Code of 1986 to improve and extend the credit for CO2 sequestration.

Bill Introduced to Reauthorize Geologic Mapping Program Through 2023

On September 11, 2017 Senator Lisa Murkowski (R-AK) introduced a bill (S.1787), cosponsored by Senators Angus King (I-ME) and Dan Sullivan (R-AK), to reauthorize the National Cooperative Geologic Mapping Program (NCGMP) through 2023. The program, overseen by the U.S. Geological Survey (USGS), was originally established through the National Geologic Mapping Act of 1992 to expedite the production of geologic maps of the United States, which are used by public and private entities for resource exploration and extraction, natural hazards mitigation, ground and surface water management, environmental protection, and federal land management. The Act was last reauthorized in 2009, and is currently set to expire in 2018.

The NCGMP works with federal, state, and university partners in three separate program components to produce mapping data which is presented in the National Geologic Map Database (https://ngmdb.usgs.gov/ngmdb/ngmdb_home.html). For state (STATEMAP) and education (EDMAP) programs, funds are awarded through a competitive grant process which requires the applying state or university to match any federal funding awarded for mapping projects. Funds for federal geological mapping projects (FEDMAP) are also distributed through a review process that includes external stakeholders, such as other federal agencies and the American Association for State Geologists (AASG), which collaborate with the NCGMP to determine mapping priorities and carry out the mapping projects.

Understanding the geology of an area is essential for making well-informed policy decisions. Geologic maps lay the foundation for minimizing risks from natural hazards and help ensure responsible environmental stewardship, mitigate natural hazards, and foster economic growth. Still, less than a third of the U.S. is mapped at the level of detail needed to make these important decisions for resource and land management. S.1787 was referred to the Senate Committee on Energy and Natural Resources.

White House Issues Plans for Prompt National Environmental Policy Act Reviews

On September 14, 2017 the Council on Environmental Quality (CEQ) published a list of actions that it will take to revise the federal environmental review and authorization processes for infrastructure projects. The proposed actions primarily address the National Environmental Policy Act (NEPA), which requires federal agencies to assess environmental effects of proposed actions prior to making decisions. Of note, NEPA is responsible for decision making on permit applications, adopting federal land management actions, and constructing highways and other publicly owned facilities.

President Donald Trump has declared U.S. infrastructure, as well as environmental reviews **Government Update** *continued on page 28*

Government Update continued from page 27

and permitting processes, a top priority for his administration. The swift action by the CEQ is in response to Executive Order 13807, "Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects" signed by President Trump on August 15, 2017. The executive order directs federal agencies to follow transparent and coordinated processes for conducting environmental reviews, reduce the timeline of reviews and authorization decisions for new major infrastructure projects to an average of two years, and implement "One Federal Decision" requiring a lead federal agency for each infrastructure project to coordinate a single Record of Decision that combines any individual agency decisions related to the project. In the September 14, 2017 Federal Register notice, the CEQ announced its plans to comply with requirements of the executive order, and intends to develop a framework for implementing "One Federal Decision" with the Office of Management and Budget (OMB).

The ultimate goal of NEPA is to foster action that protects, restores, and enhances our environment. Following its enactment in 1970, Congress developed a procedure referred to as the environmental impact assessment process to implement NEPA's policies. According to the Department of Energy (DOE), NEPA has been effective in providing public officials with the information they need to make better decisions and it has since been replicated throughout the world.

Bill to Reauthorize National Earthquake Hazards Reduction Program Introduced in Senate

On September 6, 2017 Senator Dianne Feinstein (D-CA) introduced a bill (S.1768) to permanently reauthorize the National Earthquake Hazards Reduction Program (NEHRP). First authorized in 1977, NEHRP has led to significant improvements in earthquake research and infrastructure preparedness. The program's most recent authorization expired in 2009.

Since its initial authorization, NEHRP has helped communities prepare for and protect against earthquakes. The program coordinates earthquake hazard risk reduction efforts at federal, state, and local levels. Four federal agencies oversee NEHRP: The National Institute of Standards and Technology (NIST), Federal Emergency Management Agency (FEMA), U.S. Geological Survey(USGS), and National Science Foundation (NSF). The program also works extensively with state and industry experts on program implementation.

New and updated provisions to the bill will allow for better hazard management and emergency response. The bill calls for the creation of a set of maps showing active faults and folds, liquefaction risk, landslide risk, and susceptibility to seismically induced hazards. Another requirement of the bill is a comprehensive report of the risks that earthquakes pose nationwide and the efficacy of risk reduction programs. The bill also calls for the continued development of the Advanced National Seismic System (ANSS), including the Earthquake Early Warning (EEW) system, which was flagged for elimination in the President's fiscal year (FY) 2018 budget request.

S.1768 is cosponsored by Senators Lisa Murkowski (R-AK), Cory Gardner (R-CO), Ron Wyden (D-OR), Kamala Harris (D-CA), Jeff Merkley (D-OR), and Maria Cantwell (D-WA). The legislation is supported by multiple professional societies, such as the American Society of Civil Engineers (ASCE), Association of American State Geologists (AASG), Geological Society of America (GSA), and Seismological Society of America (SSA).

House Discusses Three Bills on Energy and Mineral Development

On September 6, 2017 the House Natural Resources Subcommittee on Energy and Mineral Resources discussed three bills that were introduced before the August recess. Two of these bills seek to amend to the Mineral Leasing Act of 1920 (30 U.S.C. 181), while the third bill proposes a new method for state onshore oil and gas leasing on federal lands.

The State Mineral Revenue Protection Act (H.R.2661), introduced by Representative Liz Cheney (R-WY-At-large), would amend the Mineral Leasing Act to ensure an equal split in revenues between federal and state governments for onshore mineral revenues. The bill would eliminate a two percent administrative fee collected by the federal government, which amounted to $25 million in 2016. A companion bill (S.1267) was introduced in the Senate on May 25, 2017 by Senator Mike Enzi (R-WY).

During the hearing, the subcommittee heard from Representative Scott Tipton (R-CO-3) about his bill, the Planning for American Energy Act of 2017 (H.R.2907), which was cosponsored by Subcommittee Chairman Paul Gosar (R-AZ-4). H.R.2907 would amend the Mineral Leasing Act to require the Secretary of the Interior to publish a federal onshore energy production strategy report every four years. The proposed requirement is modeled after a report the Administration must submit to Congress every five years for offshore oil and gas development.

The Federal Land Freedom Act (H.R.3565) dominated discussions at the hearing, facing strong opposition from Democrats on the committee. H.R.3565 would allow states with established leasing, permitting, and regulatory programs for onshore oil and gas to assume jurisdiction over these processes on federal land within their state. It would permit states to collect an administrative fee, although any royalties or revenues collected from the leases would still be deposited into federal accounts. This bill would only apply to certain areas of federal land that are identified by the Bureau of Land Management (BLM) or the U.S. Forest Service as lands available to lease for exploration, development, and production of oil and gas. The main concern expressed by Democrats at the hearing was that only sixteen out of fifty states have a process similar to the National Environmental Policy Act

(NEPA) allowing for public comment on lease sales, so the public would not have the opportunity to engage with state regulators.

Hardrock Mining Reform Bill Introduced in Senate

Following the House Natural Resources Subcommittee on Energy and Mineral Resources hearing on hardrock mines, the Senate is now wading into the contentious area of mining policy reform. Senator Tom Udall (D-NM), along with four Democratic cosponsors, introduced the Hardrock Mining and Reclamation Act of 2017 (S.1833). Senator Udall's bill would affect mining legislation laid out in the 1872 General Mining Act (30 U.S.C. 24), a law enacted in the Gold Rush-era that has remained largely unchanged since its passage; the new bill includes provisions for collecting royalties and establish a reclamation fund.

The Hardrock Mining and Reclamation Act of 2017 would impose a royalty of two to five percent for new mining operations based on gross income. Although some states charge their own royalties, there is no federal royalty for mineral commodities mined on public lands, unlike oil and gas or coal operations. Opponents of a hardrock mining gross royalty cite the differences in producing commodities from hardrock mines compared to oil and gas or coal; commodities from hardrock mines are not usable until after being processed, and different metals have different markets. The proposed legislation would, however, allow the Secretary of the Interior to grant royalty relief to companies depending on the market and other economic factors.

The bill would also create a Hardrock Minerals Reclamation Fund, similar to the Abandoned Mine Lands (AML) fund for coal extraction sites, to pay for cleaning abandoned hardrock mine lands. AML funding comes from a fee charged to coal companies based on the amount of material they mine. S.1833 would establish a similar fee for hardrock mines that would be determined based on the value of the mining production instead of the material removed.

Jim Bridenstine Nominated to NASA Administrator

Continuing to fill key administration positions, President Donald Trump announced his intent to nominate Representative Jim Bridenstine (R-OK-1) to serve as the next Administrator for the National Aeronautics and Space Administration (NASA). If confirmed by the Senate, Bridenstine would be the first NASA Administrator to be appointed with a professional background in politics, rather than a science and engineering background.

A former military pilot serving his third term in Congress, Representative Bridenstine is well-known for a range of civil, commercial and military space issues. He is currently on the House Committee on Science, Space, and Technology, and sits on the Subcommittees on Energy and Space. In April 2016, Representative Bridenstine introduced the American Space Renaissance Act (H.R.4945), a wide-reaching reform bill that would change how the Department of Defense (DOD) and NASA approach space acquisitions and operations. Although the bill itself did not pass, ten of its provisions were bundled into other legislation that did pass. Representative Bridenstine was also involved in creating the commercial weather data pilot programs at the National Oceanic and Atmospheric Administration (NOAA) and Department of Defense (DOD).

Bridenstine's nomination was sent to the Senate along with 45 other nominations on September 5, and it has since garnered mixed responses. The Chairman of Commercial Spaceflight Federation and the CEO of the Space Foundation have both praised the choice of Bridenstine. In contrast, Florida Senators Marco Rubio (R) and Bill Nelson (D) were both reticent about the nomination of a NASA Administrator with deep political affiliations, although neither Senators have committed to voting against Bridenstine.

Senate Moves Legislation to Address Harmful Algal Blooms

In recent years, massive harmful algal blooms (HABs) have devastated critical habitats along the Florida coasts and Great Lakes. These phenomena can cause significant "dead zones" and disastrous consequences for ecosystems and economies, resulting in economic losses from multi-billion-dollar fishing, shipping, and tourism industries. On September 27, 2017 the Senate responded to these disasters by unanimously passing the Harmful Algal Bloom and Hypoxia Research and Control Amendments Act of 2017 (S.1057), introduced on May 4, 2017 by Senators Bill Nelson (D-FL), Gary Peters (D-MI), and Rob Portman (R-OH).

The Harmful Algal Bloom and Hypoxia Research and Control Act (HABHRCA), which was initially authorized in 1998, requires the development of a federal response to address the frequent occurrences of HABs and environments with severe oxygen depletion and established the Inter-Agency Task Force on HABs and Hypoxia through the White House Office of Science and Technology Policy.

The Senate bill reauthorizes the HABHRCA for fiscal years 2019 through 2023, including a total of $110 million funding for further research into the causes and control of large algae blooms and hypoxia. The legislation also adds a representative from the Army Corps of Engineers to the Inter-Agency Task Force on HABs, and grants the federal government the authority to declare severe algal blooms or hypoxic events as events of national significance, which would trigger access to disaster-like funds. In a statement released by his office, Senator Bill Nelson emphasized that this legislation will help make federal assistance available to those most impacted by these algae outbreaks.

The bill now heads to the House of Representatives for consideration, where another HABs bill, the Harmful Algal Blooms Solutions Act of 2017 (H.R.3661), was recently introduced by Representative Brian Mast (R-FL-18) to establish a program to award prizes for the development of innovative, environmentally safe solutions for reducing, mitigating, and controlling harmful algal blooms. ■

HGS Welcomes New Members

New Members Effective December 2017

ACTIVE MEMBERS

James Brewton

Tyson Caines

Gordon MacMillan

Andrew Madyarov

Cem Ozan

STUDENT MEMBERS

Mohammed Abu Alreesh

Ezzedeen Alfataierge

Julian Chenin

Po-Hsu Chenin

Benjamin Consolvo

Johnathon Osmond

Anne Rosett

Andrew Steier

Dustin Villareal

Dillon Worley

Welcome New Members

Remembrance

Philip Padgett

1962-2017

Philip Padgett passed away December 19, 2017 at Baylor Scott and White Medical Center in McKinney, TX. He was surrounded by his parents and siblings during a brief illness. Philip was comforted with scripture, prayer, and Holy Communion.

Philip was born on June 1, 1962 in Wapenamanda, New Guinea. His parents were missionaries. He was baptized in infancy. He was raised in Apache, OK and graduated from Apache High School in 1980. He graduated from Oklahoma State University in 1984 with a B.S. in Geology, and later with a M.S. in Geology. He was married to Shelley Hudson and they later separated. Shelley and Philip spent a couple of years in west Texas in the oil industry. He worked for many years in the oil industry, settling in the Houston area in 1989, and living there until his illness. In addition to serving as the Chair of the Membership Growth Committee at HGS, Phil was also a member of AAPG, and held prior positions as Senior Operations Manager at IHS Energy, Well Data Specialist at Nexen Energy, Database Specialist at Concho, SubSurface Well Data Manager at BHP Petroleum, Senior Geoscientist at Schlumberger, Geologist at Pennzoil, and Geoscience Technician at Bogart Oil Company.

He is survived by his children, Brent Padgett (Maddie) and their daughter Evelyn of Tulsa, OK and Lance Padgett of the University of Texas-Austin, and their mother, Shelley Hudson-Hollingsworth, of Tulsa, OK. He will also be lovingly remembered by his parents, Reverend Stanley and Norma Padgett, of Apache, OK, and his siblings, Paul (Sherri) Padgett of Apache, John (Natalia) Padgett of Austin, TX, Michael Padgett of Stillwater, OK, Martha (Kim) Ross of Trophy Club, TX, Elizabeth (Dan) Herink of Houston, TX, and Rebekah (Jim) Cooksey of Prosper, TX, his grand-aunt, Irene Thoes, of Wamego, KS, and many uncles, aunts, nieces, nephews, and cousins.

The service of the resurrection and burial was held December 27, 2017 at St. John Lutheran Church of Alma, KS, with burial in the Alma Cemetery. Memorials are suggested to St. John Lutheran Church, and may be left in care of Stewart Funeral Home of Alma, KS, P.O. Box 126, 66401. A memorial service will be held in his home church, Peace Lutheran Church of Cyril, Oklahoma, at 11:00 a.m., December 31, 2017. ■

Big Continent - Big Ideas - Big Opportunity
Strategies for Success
The 17th HGS-PESGB Conference on African E&P

September 11-12, 2018 • Houston Texas

Guidelines For Abstract Submission

Submit your abstract for consideration as either an oral presentation or poster, by sending it, as an email attachment, to Africa2018@hgs.org. Submissions should be sent as soon as possible and no later than March 15, 2018.

Assessment of the abstracts will be based upon the quality of the abstracts and the relevance to the suggested topics as listed below:

- African E & P in the evolving business environment - above ground risks & rewards
- New and emerging exploration trends
- Gas and oil in N. and E Africa
- Developing and integrating geological concepts: Impact on exploration in Africa
- Big data, AI and innovative technologies applied to African E & P
- What we thought we knew – Exploration concepts to production reality

Abstracts should be:

- Length should be a maximum of two 8.5 x 11-inch pages, and may include diagrams in color or black and white, and references. Please use Arial font, size 10, left justification alignment, and single spacing.
- Submit as either MS Word 2016/ 2013/2010 documents with graphics embedded in to the document.
- Each file submitted should include the principal author's surname in the file name.
- Include contact information (email address) for the principal author in the abstract.
- Indicate the speaker with an asterisk (*) after the name in the author list.

The principal author of submitted abstracts will be notified of the committee's decision no later than April 30, 2018.

Accepted Submissions:
Each author is requested to submit a Short Abstract (up to 2 pages) with an opportunity to also submit an Extended Abstract for their oral or poster presentation.

Short Abstracts (due by July 31)
Short abstracts (up to 2 pages) will be reproduced on 8.5 x 11-inch paper and handed out at the meeting in the proceedings volume.

- A formatting template will be provided to authors of all accepted submissions to assist in preparing of abstracts.
- Authors are solely responsible for the content of the material submitted and will be asked to release HGS, PESGB and the sponsors from any consequence of distribution of the material.
- Accepted abstracts may be posted and/or archived on the HGS web site.

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Guidelines For Abstract Submission Continued

Extended Abstract (due by July 31)
Authors of accepted oral and posters are also encouraged to submit an extended abstract that may include references, appendices, figures and maps and will be eligible for higher marks within the awards system. Extended abstracts will be compiled on a CD in Adobe Acrobat (PDF) format, reproduced and distributed along with the proceedings volume of short abstracts to participants at the conference. The CD will not be secured or protected by copyright.

- Length may be several pages in length and can include B&W or color graphics.
- Include contact information for the author(s) in the abstract (email and/or mailing address).
- Page size should be 8.5 x 11 inch. A formatting template will be provided to authors of all accepted submissions to assist in preparing extended abstracts.
- Graphics can be text figures, page-sized or oversize and may be in color.
- All or part of your PowerPoint presentation can be included.
- Oversize maps or figures from your poster could also be used.

Registration
The principal author (Speaker) of each accepted submission for oral presentations and posters will receive complimentary registration to the conference.

Awards
The HGS will be recognising the best technical contributions with its prestigious awards; made by a respected panel of industry judges. The presentation ceremony will take place at the conference close.

Awards will be made for
- Best Student Poster
- Best Poster
- Best Oral Paper

Importantly authors should note that 50% of the marks from the judges will be allocated for the abstract. Also, extended abstracts are encouraged and will be eligible for higher marks within the awards system.

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.**

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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.	

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revised 5/02/17

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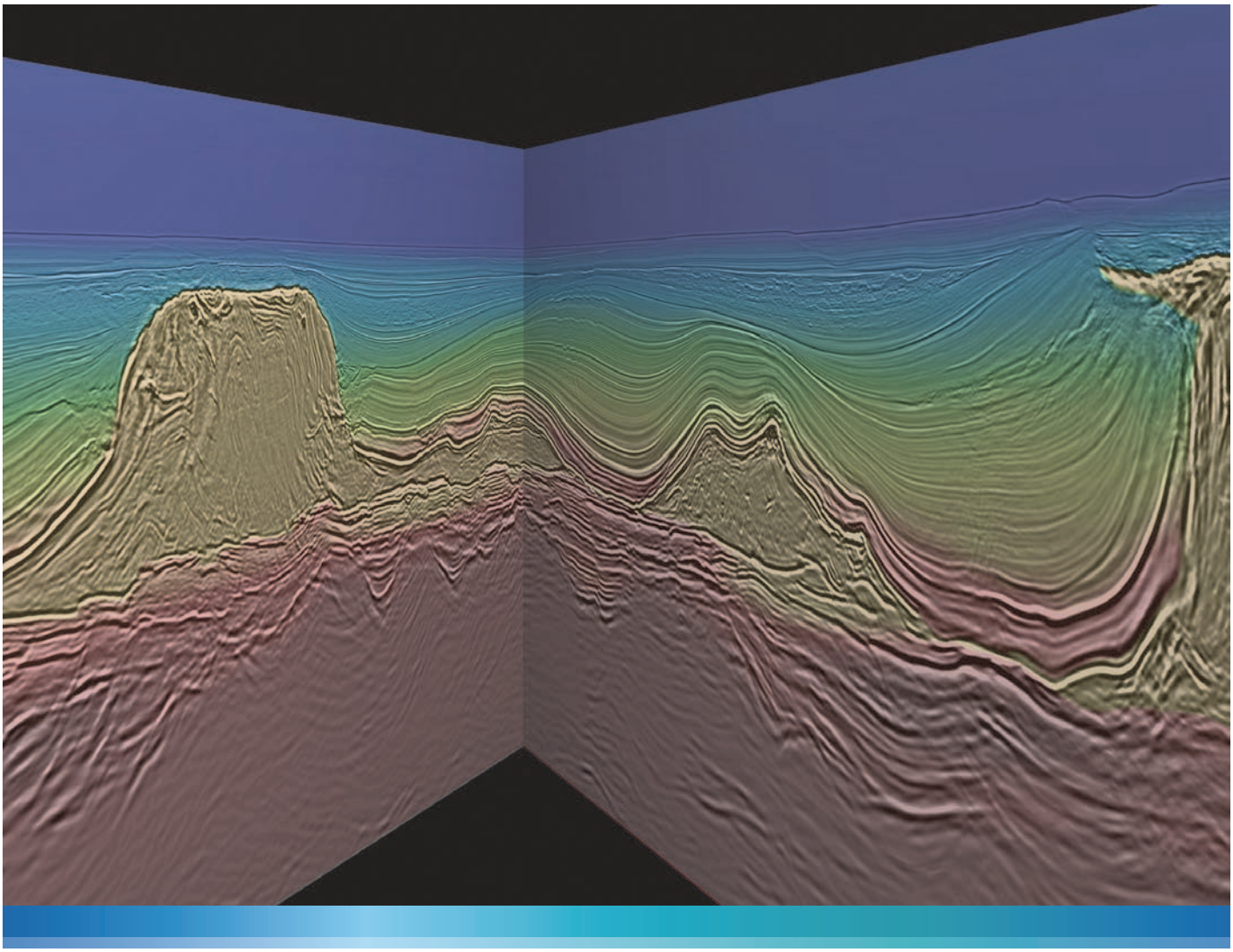

Santos Basin

Brazil – Santos Vision Area 1

PGS announces the availability of Area 1 from its Santos Vision project within the pre-salt play in the Santos Basin, offshore Brazil. The total project will cover 34 000 sq.km.Exploration plays in Area 1 include: a rift/pre-rift fault-trap play in the west-central part of the area, with prospective siliciclastic reservoirs in the Paleozoic pre-rift through Lower Cretaceous rift succession; a sag/rift limestone edge play (Sagitário trend), involving subsalt structural or paleo-topographic traps in microbial platform limestone; and the Carcará North/Uirapuru sag-rift limestone play, which includes the Carcará discovery in BMS-8 and several significant closures at the base of salt.

Santos Vision Area 1 deliverables will be available for the upcoming license rounds.

Please contact: brazilinfo@pgs.com

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