

HGS Bulletin

Volume 59, Number 1

Houston Geological Society

September 2016

AFRICA: WHAT'S NEXT? THE 15TH HGS-PESGB CONFERENCE ON AFRICAN E&P

PAGE 10-19

OIL PRICES LOWER FOREVER? HARD TIMES IN A FAILING GLOBAL ECONOMY

PAGE 23





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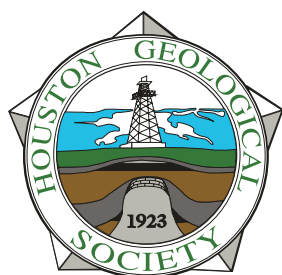
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The Bulletin

Houston Geological Society

Volume 59, Number 1

September 2016

In Every Issue

- 5 Your Board in Action**
by John Jordan
- 7 From the Editor**
by Tami B. Shannon
- 30 GeoEvents Calendar**
- 44 New Members**
- 52 Author Instructions**
- 53 HGS Membership Application**
- 54 Professional Directory**

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Technical Meetings

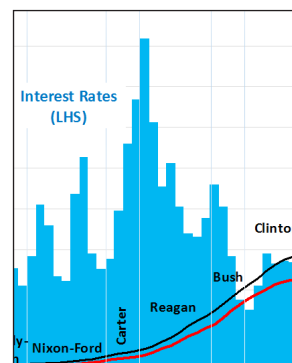
- 19 HGS International Dinner Meeting**
Imaging Basin Architecture with Passive Source Seismic Data: Results from Eastern and Southern Africa Using AfricaArray Data
- 21 HGS Environmental and Engineering Dinner Meeting**
Seeing Things Differently: Rethinking the Relationship Between Data, Models, and Decision-Making
- 23 Joint HGS General and North American Dinner Meeting**
Oil Prices Lower Forever? Hard Times in a Failing Global Economy
- 27 HGS General Luncheon Meeting**
Application of Global Outcrop Belts to Exploration and Field Extension in the Deep-water Paleogene Trend, Gulf of Mexico

Other Features

- 6 Earth Science Week**
- 10 Africa Conference**
- 12 One-Day Short Course**
Petroleum Systems and Discoveries of Offshore Northwest, North and East Africa
- 14 One-Day Short Course**
South Atlantic Margins: Geology and Hydrocarbon Potential
- 29 Internship Status at the Big Bend National Park**
- 32 HGS Golf Tournament**
- 35 Guest Night Blasts into Lunar Orbit with Moon Science**
Linda Sternbach and Pete Emmet
- 36 Take a Kid to the Outcrop Family Campout**
- 38 Houston Geological Society President's Night Award Dinner**
Tami Shannon
- 43 2016 HGS Skeet Shoot – The Changing of the Guard**
- 45 Government Update**
Henry M. Wise and Arlin Howle
- 48 Remembrance**
Jimmy Richey Kirk
- 50 Remembrance**
Cyrus Strong V
- 51 AAPG Delegates – Houston Geological Society**



page 10-19



page 23

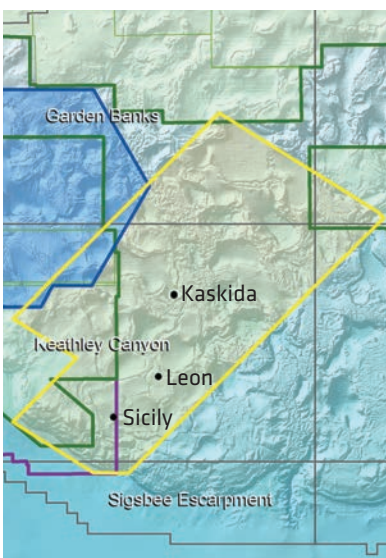
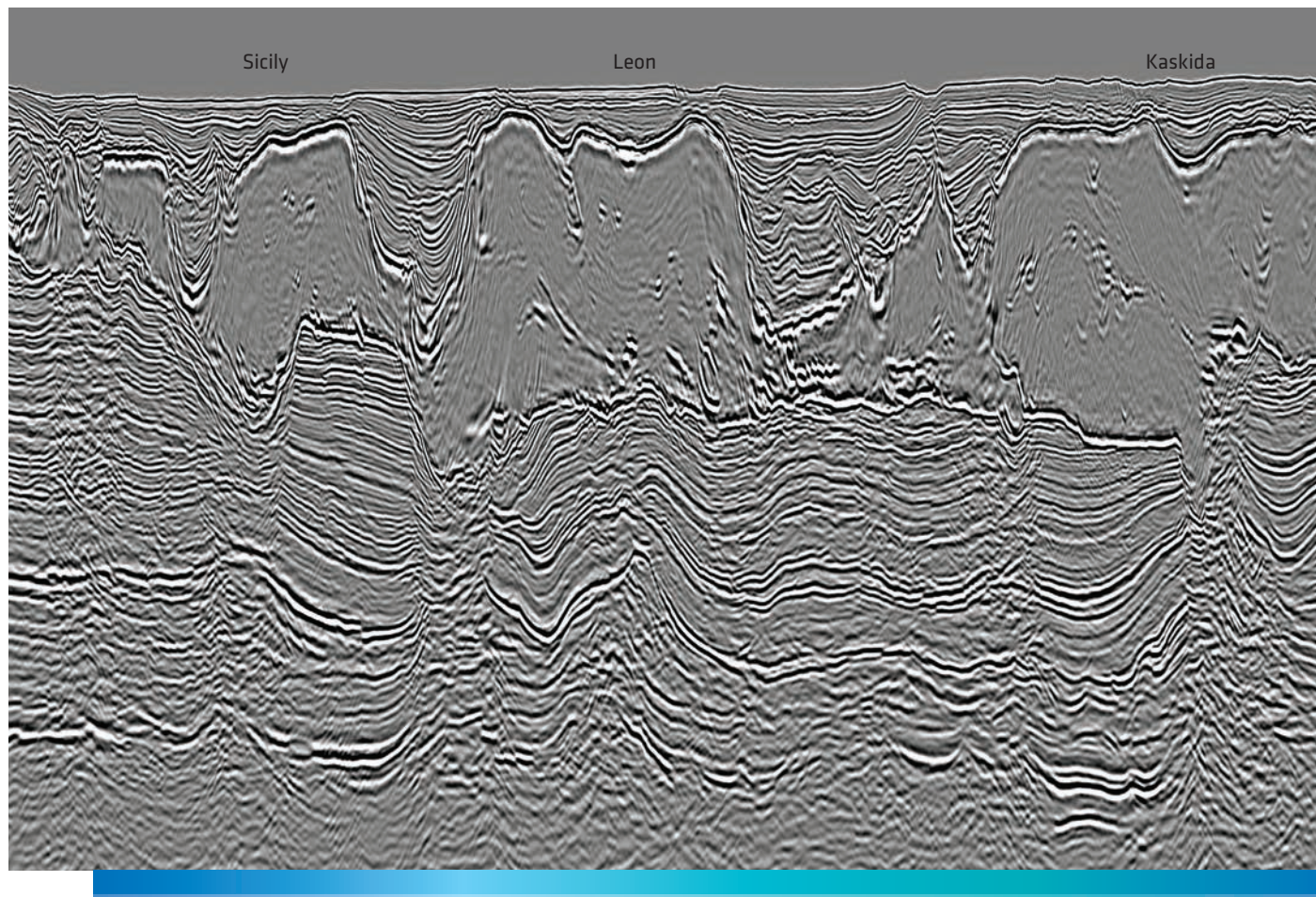


page 27



page 32

About the Cover: Photograph of the Eastern Branch of the East African Rift (near Kenya's southern border) was acquired on January 14, 2012 and is provided by the ISS Crew Earth Observations experiment and Image Science & Analysis Laboratory, Johnson Space Center. This image (ISS030-E-35487) was taken by the Expedition 30 crew. Similar images can be obtained from <http://earthobservatory.nasa.gov> (Read more on Page 37)



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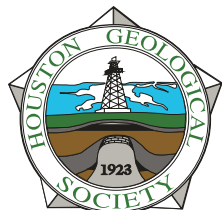
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John Jordan
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Who Are You?

Geologist Poroperm – you have been laid off. Geophysicist Hertz – you survived the latest cuts, but are unsure about your career progression. Both geoscientists wonder: “Do I have a future in this industry?” The answer to this question depends on you.

In a downturn, it’s important for you to make a self-assessment - whatever situation you’re in. Look in the mirror and ask yourself “Do I really like this type of work? Am I willing to do what it takes at any cost to stay in this industry?”

If you believe that the oil and gas industry is your life’s calling and desperately want to find an oil field, you can. I know this first-hand because I have been laid off multiple times and found lots of oil after that in my career. I gathered perseverance and advice from getting to know the hard core, as I call them, of the oil and gas industry. Their stories are very similar to mine.

They found opportunity in adversity and fellowship with others through their professional affiliations. Many of you have had the opportunity to experience the up times in our industry; it can become a slog in the down times.

One of the most powerful things you can do is document who you are and what you have done. Industry legal and human resource departments have limited their responses during reference calls to simply verifying employment. Therefore, people must cultivate outside validation of professional experience. I was often surprised by the lack of interest newbies expressed when coming into my office about the displays of my professional certifications. Rarely was I asked why I was a certified member of the AAPG or a licensed Geoscientist in the state of Texas.

I joined the AAPG when I was in graduate school. My initial reason to become a member was that they were the only quality source of oil and gas oriented literature. This seemed like the right thing to do given that my goal was to find hydrocarbons. The AAPG was my opportunity to associate with other oil and gas professionals and get a stamp of acceptance in my chosen career. How? To become an *active member* of the AAPG you need someone who is an *active member* to sponsor you. This is a form of acceptance within the professional ranks of the oil

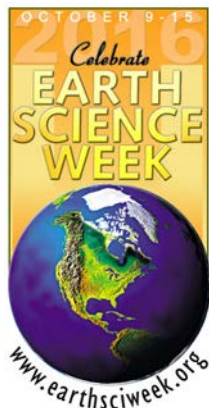
and gas industry. This might have been enough during the good times we just left two years ago but it is probably not going to be enough during the down times we are currently experiencing. AAPG Certification or becoming a member of the Division of Professional Affairs (DPA) is a type of certification that documents your work history and experience. It is a global certification of your skill set by the leading oil and gas Society in the world. You will need some minimum amount of work experience to be an *active member* and then can apply as a coal geologist, petroleum geologist, petroleum geophysicist or qualified reserve evaluator which then makes you a DPA member. Some geoscientists are certified in more than one area. Another method of validating your technical knowledge is by being licensed in the state of Texas which requires passing a written exam and then paying yearly dues. The license allows you to give legal depositions and testify in court. Some states offer reciprocity. A state license provides a unique and different aspect of your professional qualifications where many others do not have the legal right to participate.

The single biggest event of my tenure as President of the HGS is the 2017 AAPG Annual Convention and Exhibition (ACE) that will be held in Houston, Texas in April, 2017. The meeting coincides with the 100-year anniversary of the AAPG. This will be a historic event. Those of you that are looking for work will find a fantastic networking opportunity by volunteering and attending ACE. For all geoscientists ACE will be the best opportunity to expand their technical knowledge base cheaply. If the industry is still climbing out of the slump, Houston employers probably will actively discourage you to attend because of cost. However, *You are* in charge of keeping your skills strong and doing so benefits you and your company. I am certain that some employers will give staff the time off if individuals pay their own registration. This is a small price to attend the world’s premier petro-technical conference and hear industry reviewed talks and posters on cutting edge concepts and technology in our industry.

One of my goals as President of the HGS is to increase our membership and get every

From the President continued on page 9

*They found opportunity in
adversity and fellowship
with others through their
professional affiliations.*



Earth Science Activities for the Whole Family Coming in October!

Earth Science Week, 2016

October 8 – 16



HGS in partnership
with the American Geosciences Institute (AGI)
is pleased to announce the theme of Earth Science Week 2016

“Our Shared Geoheritage”

This year’s event explores our natural wonders, landforms, and resources
that have formed over eons.

**In celebration of Earth Science Week Houston,
HGS will be hosting the following exciting events:**

Saturday, October 8 (11:00am – 3:00pm)

Earth Science Celebration at the Houston Museum of Natural Science
Our popular passport program guides students through hands-on activities and
interactive science demonstrations.

Special pricing for the event: \$3.50 K – 12 students

\$3.50 College Students/Teachers/Professors with valid school/college ID

Teachers: 2016 ESW Toolkits free with valid school ID

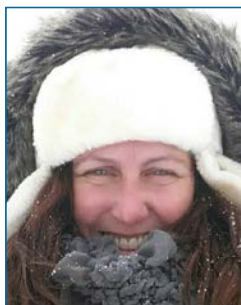
Sunday, October 16 (Arrive between 11:00 am – 3:00 pm)

A free family-friendly outdoor geology fieldtrip to Panther Creek, Montgomery
County Preserve, south of The Woodlands. Come explore meandering stream
processes with us! Learn about meander bends, point bars, delta bar deposits,
cut banks and the local flora.

For more information, see the HGS Earth Science Week webpage.

<http://www.hgs.org/committee?cmtegrp=sci&committee=Earth%20Science%20Outreach%20Committee>





Tami B. Shannon
tami.hgs@gmail.com

Geologic Inspiration: Getting Back into the Field

As another fall season approaches, I can't help but think of being outdoors: going on hikes, watching the leaves turn colors, and eagerly anticipating cooler temperatures. This has always been the time of year that fondly reminds me of my geology field trips and just simply getting outside to explore the world, getting lost in the wilderness, and feeling like I was one with nature – the key reasons I fell in love with geoscience in the first place.

In particular, it was the smells. They say smells trigger memories – but I also say that memories can trigger those smells. As I trudged through some of my old trip photos – I could actually remember how those places smelled! The various aromas of decaying leaves, wet rocks in a creek bed, the earth under my fingernails from digging out those rocks, and dried mud on my hiking boots after a day in the field. This was my inspiration for dropping my engineering degree path to pursue environmental geology.

My first real geology field trip was a fossil hunt somewhere in Minnesota not too far from my university. I had spent most of the day goofing off, and jumping from rock to rock – pretty much because no one was finding anything other than miniature brachiopods. The class was getting ready to leave the site and I just happened to turn



My geologic inspiration: a random broken cephalopod.

over some flat rock...and there it was! A cephalopod in all its two-inch glory! It wasn't complete, but in my mind, this was the most exhilarating thing to happen to anyone that day! No one else had found anything like it!

As I carefully handed it to my professor (who was already skeptical I had found something interesting and also thought I was the class clown), it swiftly broke in her hand. Let's just say, I shed a few tears that

day and to this day blame her for the fact it isn't worth anything. However, I just super-glued that sucker back together; I became a geologist that day after all!

From the Editor continued on page 9

*I am looking forward to
more family-oriented
HGS field trip offerings
coming up in October.*



Exploring Bryce Canyon, Utah (March 1998).

100TH AAPG ANNIVERSARY

ACE 2017

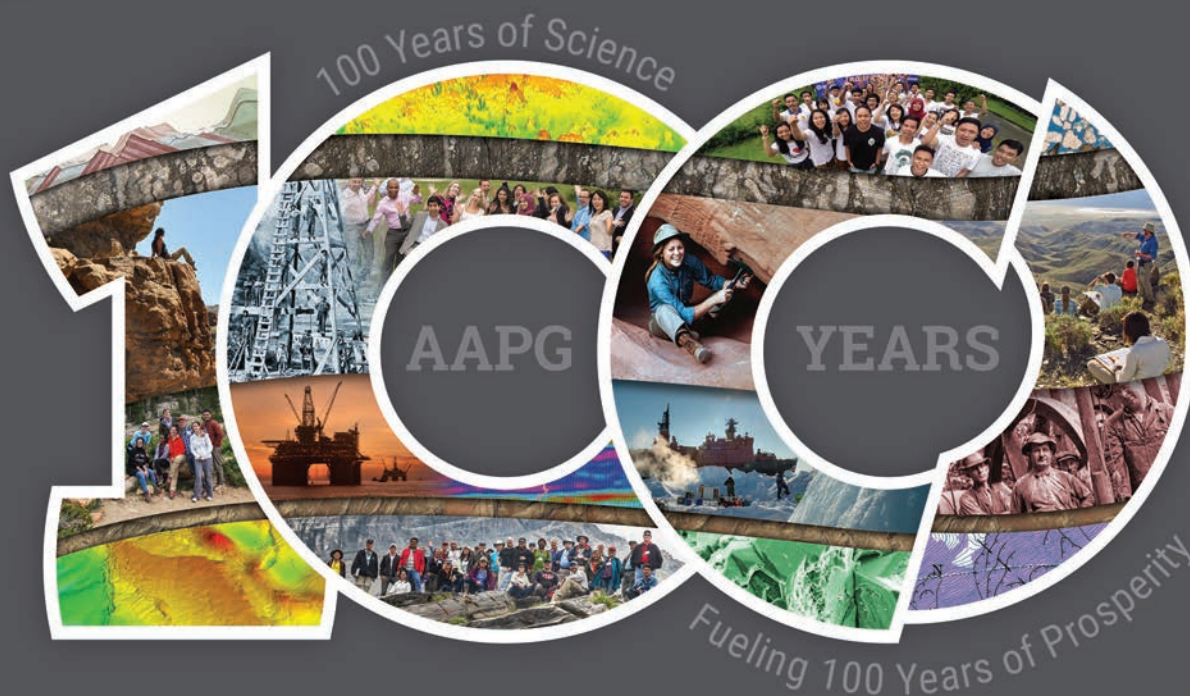
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2-5 April 2017

HGS member that is actively engaged in geoscience to either apply as an active member of the AAPG or upgrade their membership to an active level. As HGS President, why should I care about AAPG member status? The HGS is an affiliated society of the AAPG and therefore a member of the Gulf Coast Association of Geological Societies, GCAGS. The GCAGS is a section of the AAPG which represents one third or more of the total AAPG population. The HGS underpins both organizations. The HGS leadership has several paths to influence national level policies at AAPG headquarters. We are committed to keeping the value of your active membership in AAPG high by defending the quality of the active membership.

Joining and then volunteering in these geoscience societies is good for your career, adds value to your company, and strengthens the HGS. That's a win for us all. ■

From the Editor

continued from page 7

In March 1998, I took a two-week trip through New Mexico, Arizona, and Utah with a friend, and still have a jacket I use to this day because it still smells like the campground where I stayed at the bottom of Zion National Park. On that same trip, I was also fortunate to get to hike the Sand Dunes of New Mexico and Bryce Canyon; however, my ultimate goal was to hike the bottom of the Grand Canyon. I had no idea that my experience on that first encounter with the mighty Colorado River would forever change me. I was taught faith by my family, I was taught evolution by my mentors, but it was in that exquisite place that I experienced true spirituality. I continued to hike the GC alone (backcountry and all) subsequently for three more years after that initial visit. I don't remember why I stopped.

For one reason or another, imperceptible to me as I have made one small decision after another, my original life "scope of work" morphed. I never dreamed I would wind up working in the



Finally made it to the bottom of the Grand Canyon, March 1998.

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petroleum industry or working behind a computer for a majority of my day. I was supposed to save the world (environmentally-speaking), take a ride on a space shuttle, or discover another amazing new fossil on one of my incredible hikes!

As some of you might relate, I was laid off last year for a few months, and during that time did some self-reflection. Should I stay in this industry or should I simply reinvent myself altogether? I discovered that it doesn't really matter to me where I work but rather why I was no longer living the experience. I miss the pure awesomeness of the tangible earth and its formation. I miss feeling invigorated after a day hike in the great outdoors. I miss the adventure. I miss the smells.

So, my mission this year is to get back out there and to inspire you to do the same! I will pry my kids out of their indoor Pokémon trances and make them a little uncomfortable. I vow to escape the electronics, to inhale the great outdoors, and to become inspired to keep living the geologic experiences.

I am looking forward to more family-oriented HGS field trip offerings coming up in October like Earth Science Week and its free family field trip day or the "Take the Kids to the Outcrop" weekend event. I hope to plan other geologically-focused family outings this year, and I hope to share some of those local discoveries and experiences with you.

So, if you also feel you are lacking some form of geologic inspiration, I invite you to start the new HGS year with an open mind and a wide-brimmed hat; to pull out those old hiking boots and venture outside to just breathe it all in. Oh, and don't forget to smell it. ■

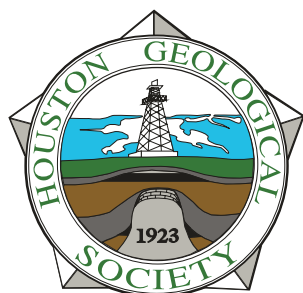


Africa: What's Next?

The 15th HGS-PESGB Conference on African E&P

September 12-14, 2016

The Westin Houston, Memorial City, Houston Texas



PES  **GB**

Information:
office@hgs.org

Registration:
www.hgs.org

Details for sponsorship opportunities and exhibition booths are available on the HGS website or contact office@hgs.org

Six of the IHS Top Ten discoveries of 2015 occurred on the African continent. This clearly illustrates why Africa is so important in the search for oil and gas. The annual HGS-PESGB Africa conference, alternating between Houston and London, has established itself as the premier technical E&P event on this fascinating, and frustrating continent. If you are currently exploring or are thinking about exploring the African continent you cannot afford to miss this conference! Scheduled speakers include the top explorers and researchers working Africa and its margins. A primary goal of the HGS during this difficult business climate is to provide inexpensive, quality training and networking opportunities for our membership and the greater geological community. We believe we have met this goal with the speakers, short courses, geophysical showcase and geological workshop we have assembled for this conference. Typical conference attendees include industry operators, consultants, governments, and academia.

The Second Annual Interactive Seismic Showcase and Geology Workshop will feature geophysical and geological vendor presentations highlighting their products and services. This proved to be a big attraction in London in 2015 and we are anticipating similar excitement at this year's event.

Short Courses

Two short courses will be held in conjunction with the conference
Duncan MacGregor – *Petroleum Systems and Discoveries of Offshore Northwest, North And East Africa*

Ian Davison – *South Atlantic Margins: Geology and Hydrocarbon Potential*

Conference Opening Evening Lecture

Prof. Andrew Nyblade (Penn State University) will present the conference opening lecture on *Seismic Imaging of Sedimentary Basins in Central, Eastern and Southern Africa using AfricaArray Data*. The lecture will be held on the evening of Monday September 12th. This event has limited seating and requires a separate reservation. Details will be on the HGS webpage under "Events".

Conference

Early Bird registration April 1 through June 30, 2016 = \$300

Regular registration July 1 through August 31 = \$400

Late/onsite registration September 1 through September 14, 2016 = \$450

Short courses

Early Bird registration April 1 through June 30, 2016 = \$200

Regular registration July 1 through August 31 = \$250

Late/onsite registration September 1 through September 14, 2016 = \$300

A \$50 discount will be given to individuals that sign up for both the conference and a short course



The 15th HGS-PESGB Conference on African E&P

September 12-14, 2016 • Houston Texas

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\$5,000	\$2,500	Breakfast Day Two	\$12,000	
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\$5,000	\$2,500	AM & PM Break Food & Beverage Day One	\$5,000	
\$5,000	\$2,500	AM & PM Break Food & Beverage Day Two	\$5,000	
\$2,500	\$1,250	Poster Gallery	\$2,500	
\$2,500	\$1,250	Delegate Bags	\$2,500	
\$1,000	\$500	Speaker Gifts	\$3,000	
\$1,000	\$500	WIFI	\$2,000	
\$1,000	\$500	Conference Signage	\$3,000	
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\$500	\$250	Note Pads, Pens	\$1,000	
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Petroleum Systems and Discoveries of Offshore Northwest, North and East Africa

A One-Day Short Course Presented by Duncan MacGregor, Ph.D.

In conjunction with the HGS/PESGB 15th Conference on African E&P

Monday, September 12, 2016 • 8 am – 5 pm

The Westin Houston, Memorial City, 945 Gessner Rd., Houston, Texas

Registration Price: Before August 31 = \$250, after August 31 = \$300. Included are notebook, certificate of attendance, networking lunch, continental breakfast, coffee and break refreshments.

Register for this course and the conference at: <https://www.hgs.org>

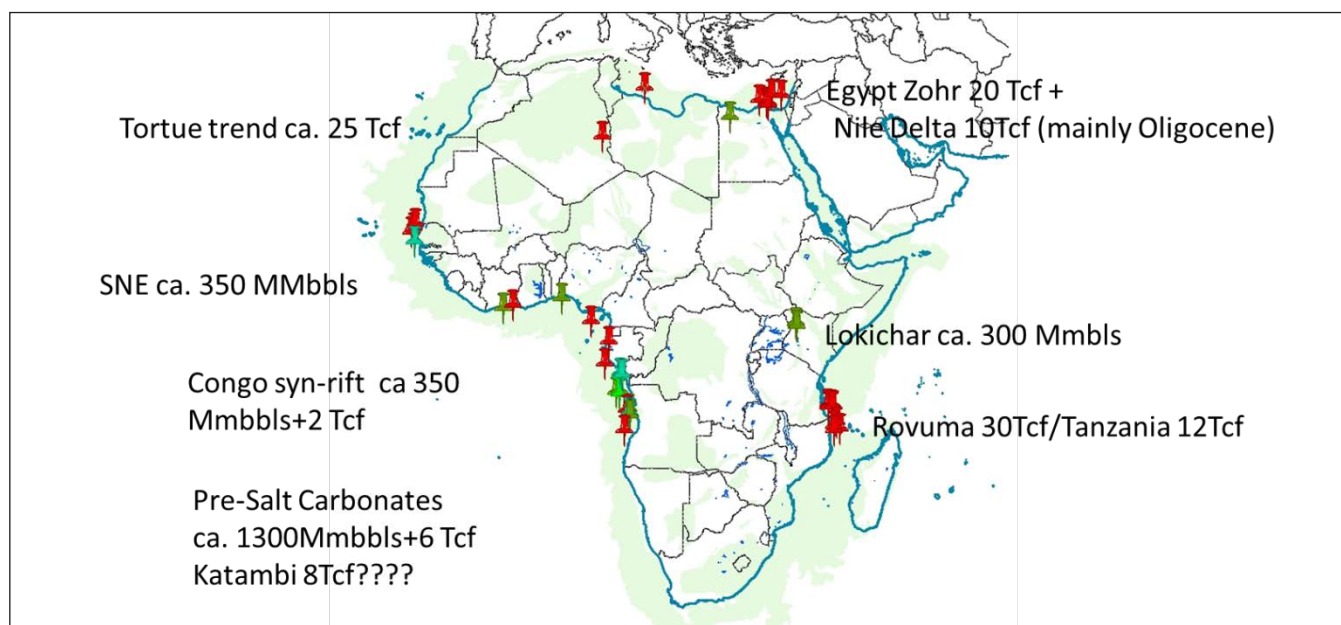


Figure 1: African Frontier Discoveries in 2013-16 period

Prior to the discovery of the Tamar Field offshore Israel in 2009, the offshore margins extending from Guinea Bissau in Northwest Africa clockwise through to Mozambique in East Africa were regarded as one of the world's largest exploration "graveyards", with only small areas of success having been defined offshore Tunisia and west Libya and in the Nile Delta. Since then the region has seen a renaissance, placing it clearly as the world's most successful recent exploration province, with some 250 Tcf (circa 43 Billion Barrels oil equivalent) discovered in the last seven years. In 2015, the two largest discoveries in the world came from this region. **Figure 1** shows discoveries in the last 3 years, which includes for 2015, two of the three largest global discoveries at Zohr and Tortue.

This course looks at the regional geology that underpins the recent discoveries, ordered through a series of paleotectonic and paleogeographic maps, a review of the various petroleum systems and the exploration history leading to the major discoveries. Productive and unproductive basins are examined through a series of basin cross-sections and chronostratigraphic charts, examples of which are given below, and the main plays and controls identified. Many aspects of the new plays have

been unusual, for instance the largest trap in the Rovuma Basin (**Figure 2**) lies on the downthrown side of toe thrusts with a reservoir heavily influenced by contourite currents and updip of a kitchen in a currently active graben.

Another somewhat unusual trap type found is the largest oil discovery at SNE in Senegal, which appears to largely be a subcrop trap (**Figure 3**). The largest global discovery in 2015 lay in a Miocene (and possibly older) pinnacle reef at Zohr offshore Nile Cone, over a high trend bypassed by two major clastic lobes of the delta, within an area characterized by extreme lithological variations.

With the exception of the SNE discovery, the key question to be asked is "where is the oil?" With so much gas now established, it will take a considerable time for markets to be found and almost all new ventures must now focus on liquids. The margins still contain many frontier basins and plays which are reviewed on this basis. The key is likely to lie in mapping diminished overburdens to the Jurassic source rocks that are the probable sources to many of the discoveries. ■

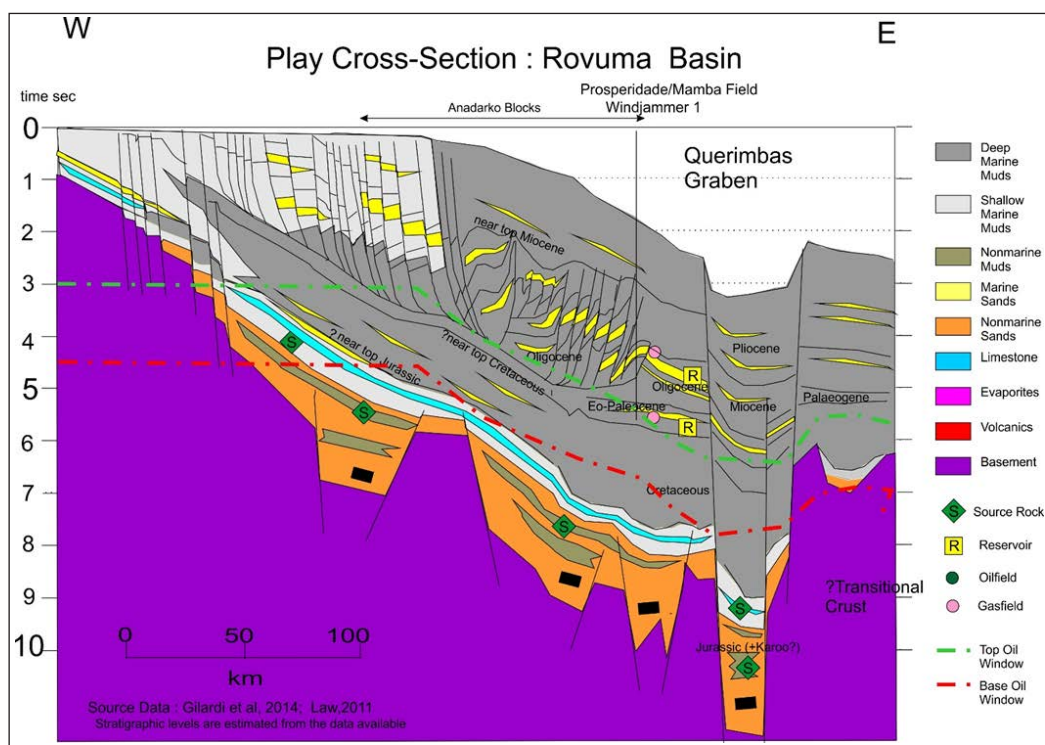


Figure 2: Play cross-section through the largest new petroleum province, the Rovuma Basin of Mozambique

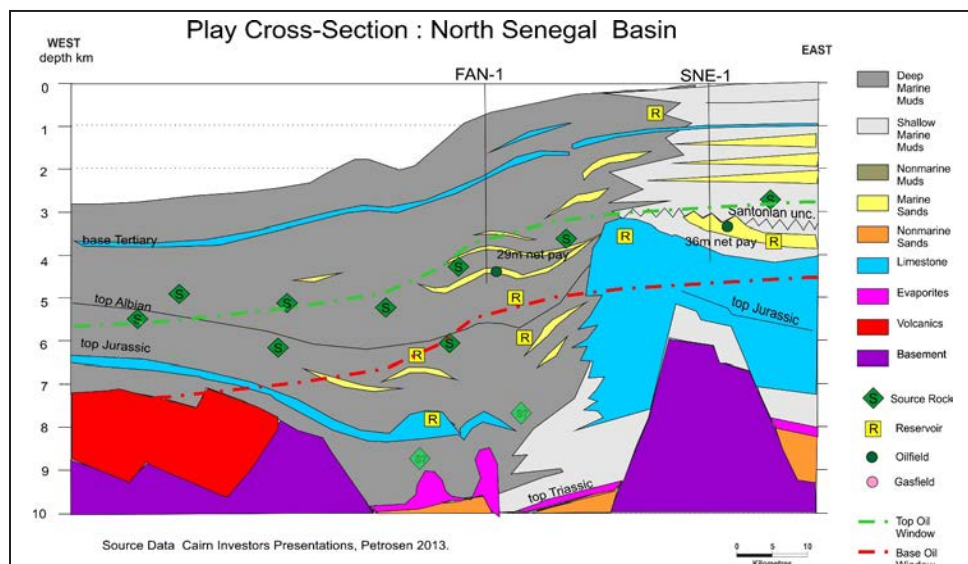


Figure 3: Play cross-section through the SNE discovery, Senegal

Biographical Sketch

DR. MACGREGOR first spent 20 years with BP and has since worked and consulted for a number of independent companies and consultancies, including PGS, Sasol and Surestream, on new ventures and play fairway scale studies, mainly in Africa. Dr. MacGregor is now an independent consultant, with his main role now being the providing training and auditing of



geological products at Halliburton-Neftex. He has been the technical chair of the London PESGB/HGS African conferences for some years, has written over 20 papers and has edited two books on African petroleum geology. He presents a number of courses on African petroleum geology, petroleum systems analysis, play fairway mapping and seal analysis. Duncan is an honorary member of the PESGB and an honorary lecturer at Royal Holloway University.

South Atlantic Margins: Geology and Hydrocarbon Potential

A One-Day Short Course Presented by Professor Ian Davison

In conjunction with the HGS/PESGB 15th Conference on African E&P

Monday, September 12, 2016 • 8 am – 5 pm

The Westin Houston, Memorial City, 945 Gessner Rd., Houston, Texas

Registration Price: Before August 31 = \$250, after August 31 = \$300. Included are notebook, USB flashdrive, certificate of attendance, networking lunch, continental breakfast, coffee and break refreshments.

Register for this course and the conference at: <https://www.hgs.org>

This one day workshop is designed to bring explorationists up to date with the recent advances in understanding the geology and hydrocarbon potential of the South Atlantic Margins.

Workshop Program

The workshop will review the development of the African and South American South Atlantic margins north of the Walvis Ridge-Rio Grande High and the Equatorial Transform Margin.

The program is structured to track the geological history and the tectonic development through time. New play concepts will be highlighted, and areas of future hydrocarbon potential will be indicated in overlooked zones of both mature and frontier basins.

1. Basement framework of the South Atlantic before opening. Distribution of Palaeozoic source rocks.
2. Opening History of the South Atlantic using reconstruction video. Discussion of timing of important events.
3. Syn-rift geology and new plays. Description of source rocks and reservoirs.
4. Aptian pre-salt sag phase: clastic and carbonate plays and prospectivity.
5. Aptian salt basin development and later salt tectonics, controls on sedimentation.
6. Albian carbonate rafts: geology and plays.
7. Deep water clastic sedimentation and salt tectonics
8. Tectonics of the Equatorial Transform Margin. New plays.

Workshop comes with most presentation slides in digital format on a USB stick, with two large scale maps of South America and West Africa included. Regional 2D seismic sections provided by Ion/GXT will be used to illustrate important aspects of the structure of the margins.

Professor Davison's presentation to the HGS International Dinner on January 20, 2014, (see outstanding Index map at

<https://www.hgs.org/civcrm/event/info?id=1365&reset=1>) entitled "Hydrocarbon Potential of the North West African Margin" can be seen on YouTube: <https://www.youtube.com/watch?v=SKiZLF-hK5w>

He also recently presented the paper "Review of Clastic Rift Plays along the Rift Borders of the Central South Atlantic Margins" at the GCSSEPM Perkins-Rosen Conference here in Houston last December 2015.

Biographical Sketch

IAN DAVISON has been Managing Director of Earthmoves Ltd. and GEO International Ltd. since 1999.

Ian received a First Class honours degree in Earth Sciences from the University of Leeds before completing his PhD on Malian Precambrian mobile belts at Montpellier and Leeds Universities. After this, he joined the British National Oil Company in Glasgow for three years where he was involved in International Exploration in NW Europe. He then moved to Salvador in NE Brazil where he lectured in Basin Dynamics, Tectonics and Precambrian Geology for five years. During this time he consulted extensively for Petrobras.

He returned to the UK in 1989 and became a Senior Lecturer in Structural Geology at Royal Holloway, University of London, where he directed the Salt Tectonics Research Group.

Ian is a Visiting Professor in the Department of Earth Sciences, Royal Holloway, University of London. He has published over 75 papers in scientific journals and books. For a list of these publications – <http://www.earthmoves.co.uk/research/>

Ian has been involved with consultancy work for over 100 oil companies exploring in Latin America and Africa over the last twenty five years.

Tutor: Professor Ian Davison, Earthmoves Ltd. Chartley, 38-42 Upper Park Road, Camberley, Surrey, GU15 2EF, United Kingdom. Tel. +44 1276 671772 ; e mail: i.davison@earthmoves.co.uk



Salt Ages in South Atlantic

(Time markers in red)

Early Albian carbonates (no exact dates)

Santos tachydrate, anhydrite halite Campos anhydrite and halite Salt > 117 < 113 Ma.
(Moreira et al. 2007)

•113.2 Ma volcanics on Florianopolis High

•114.5 Ma *T.bejaouensis* found above salt in SE-AL

Sergipe-Alagoas

Ibura Member

Ceara & Gabon

•Halite, organic shales, & K-Ca-Mg rich salt

•*S. variverrucata* (P270) interbedded in salt

•117-118 Ma Ar 39/40 ages on volcanics in Santos below pre- salt sag carbonate reservoir (Moreira et al. 2007)

•*Leupoldina cabri* 120-124.5 Ma BP Well reports.
Hedbergella sigali 121-127 Ma (Confidential report Core Lab)

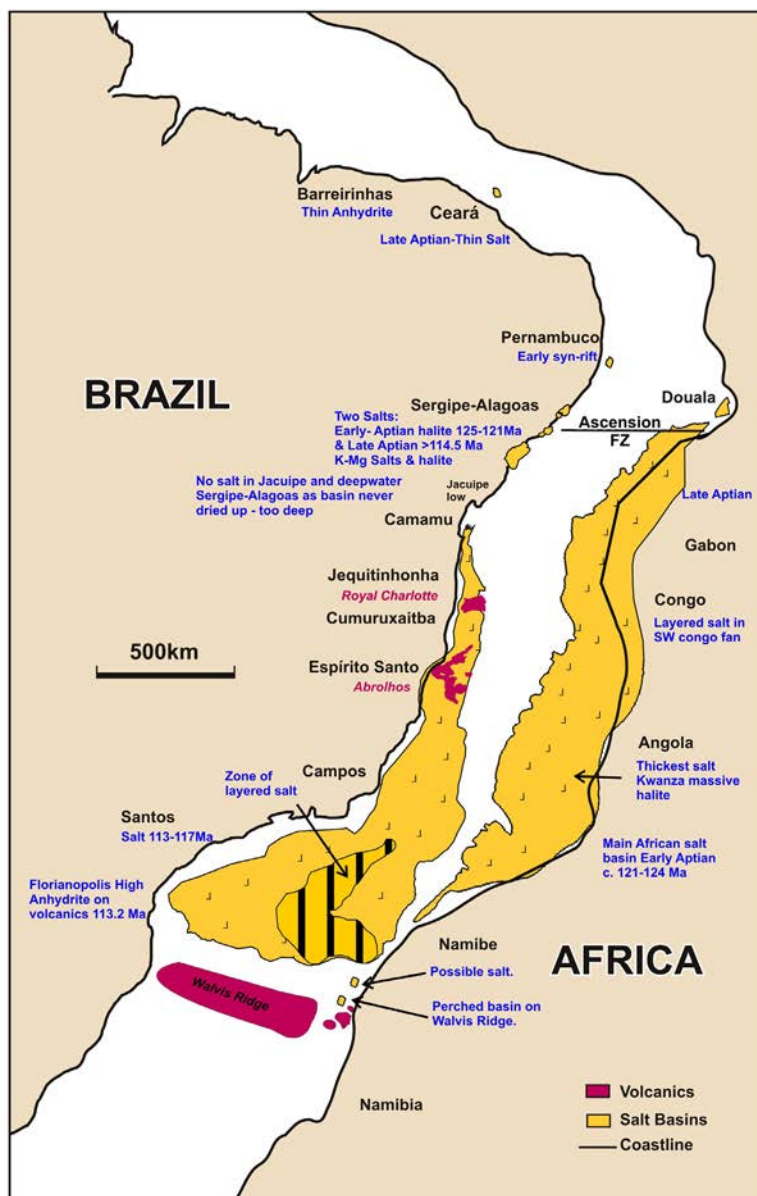
Algerianus zone >116-119 Ma, DSDP 364
All in strata above salt in Kwanza Basin.

Kwanza & Cabinda halite

•*I. crisopolensis* pollen extinction (P230) in strata above salt in Sergipe-Alagoas

Sergipe-Alagoas 124.8 Ma
Paripueira Member halite

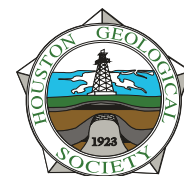
•Base Aptian 125 Ma



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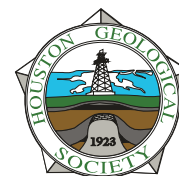
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Oral Presentations – Tuesday, September 13, 2016

8:00	Registration and Coffee	
9:00 - 9:05	Welcome and Opening Remarks: John Jordan , <i>HGS President</i>	
9:05	Session 1 Chairs: Joan Flinch , <i>Repsol</i> and Ricardo Ramirez , <i>Houston Exploration and Production Services</i>	
	Theme 1 - African Exploration in a Global Context	
9:10 - 9:35	Africa Exploration – Dealing with the New Reality?	Bob Fryklund , <i>IHS</i>
9:35 - 10:00	Gas Commercialization in Sub-Sahara Africa: Creating Value from Exploration Success	Joseph Gatdula and Young Okunna, <i>GlobalData</i>
10:00 - 10:25	Cheap Oil and the Dawn of Ultra-Deepwater Exploration	Neil Hodgson and Karyna Rodriguez, <i>Spectrum Multi-Client UK</i>
10:25 - 10:50	Keynote: Senegal – The Emergence of a Major New Hydrocarbon Province	Jon Keall , Cath Norman, Peter Nicholls, Simon Horan, Thong Huynh and Igor Effimoff, <i>FAR Limited</i>
10:50 - 11:15	Coffee and Posters	
11:15 - 11:40	A Review of our Current Understanding of Pre-Tertiary Rifting in East Africa	Duncan MacGregor , <i>MacGeology</i>
11:40 - 12:05	Structure, Evolution, and Petroleum Systems of the West African Transform Margin (Benin to Senegal), Learnings from the Past, Present and the Identification of Future Plays.	Stuart Lake , <i>Consultant</i>
12:05 - 12:30	Keynote: Petroleum System Analysis of the Deepwater Mauritania/Senegal Basin	Tracey Henderson , <i>Kosmos</i>
12:30 - 13:40	Lunch and Posters	
13:40	Session 2 Chairs: Bill Dickson , <i>DIGS</i> and Pratt Barndollar , <i>Consultant</i>	
	Theme 2 - Knowledge Transfer: Emerging Exploration Concepts, Conjugate Margins and Analogues	
13:45 - 14:10	Sliding, Collision and Sliding: Equatorial Atlantic Tectonic Evolution Constrained by Deformation History of Demerara-Guinea Conjugate Plateaus	Ana Krueger , <i>Total</i> ; Katya Casey <i>Consultant</i> ; William Dickson, <i>DIGS</i> and Seva Egorov, <i>Consultant</i>
14:10 - 14:35	Early Opening of the Southern Atlantic Basin	Jessica Fallon et. al. , <i>BHP</i>
14:35 - 15:00	How Do Seaward Dipping Reflectors Form? Evidence from the Lebombo Monocline, SE Africa and Seismic Data in the South Atlantic	Ian Davison and Ian Steele, <i>Earthmoves</i>
15:00 - 15:25	Keeping Track of Small Plates: Implications of Jurassic Motion of the Falkland-Malvinas Islands for Rifting in the Southern South Atlantic	Ian Norton et. al. , <i>Institute for Geophysics, Jackson School of Geosciences, University of Texas at Austin</i>
15:25 - 15:55	Coffee and Posters	
15:55 - 16:20	Full-Fit Reconstruction of the East Africa and Antarctica Continental Margins	Luan Nguyen , Stuart Hall, Dale Bird, Philip Ball, <i>University of Houston</i>
16:20 - 16:45	Somalia Offshore – East Africa's Frontier Oil Province	Neil Hodgson , <i>Spectrum Multi-Client UK</i>
16:45 - 17:10	Role of Late-stage Inversion on the Prospectivity of the Karoo Basins Onshore SE Tanzania	T. D. Carruthers , <i>GeoSpec Group</i> , et. al.
17:10 - 17:35	Cross-Africa Shear Zones and Their Kinematic Relationship to Rift Basins	James Granath , <i>Consulting Structural Geologist</i> ; William Dickson, <i>DIGS</i>
17:35	Evening Reception	



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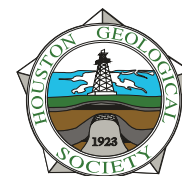
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Oral Presentations – Wednesday, September 14, 2016

8:00	Registration and Coffee	
8:30	Session 3: Carol Law, <i>Soaring Eagle</i> and Craig Schiefelbein, <i>GSI</i>	
	Theme 3 - Hydrocarbon Generation Through Time and Space	
8:35 - 9:00	Keynote: Crustal Strain Patterns in Magmatic and Amagmatic Early-Stage Rifts: Border Faults, Magma Intrusion, and Volatiles	Cynthia Ebinger , <i>Univ. of Rochester</i> , and D. Keir, <i>University of Southampton</i> , UK
9:00 - 9:25	Exploration Analogy Between the Offshore Morondava Basin, Madagascar, and the Transform Margin of West Africa	Gabor Tari and Greg Rock <i>OMV E&P, Vienna, Austria</i>
9:25 - 9:50	3D Basin and Petroleum Systems Modeling of the Zambezi Delta and Angoche Basins	Kathleen Gould , Florence Bebb, and Alice Butt, <i>Halliburton</i>
9:50 - 10:15	Geological Controls on Fluid flow Regimes, Offshore Mozambique Basin	Hannah Crompton , and Gareth Williams, <i>ERCL</i>
10:15 - 10:40	Coffee and Posters	
10:40 - 11:05	New Data, Volumetrics and Studies on Shale Oil and Gas in Tanzania	Henk Duyverman , <i>Terra Incognita</i> ; Emma Msaky Oil and Gas Advisory Bureau Tanzania and Shaidu Nuru, <i>TPDC</i>
11:05 - 11:30	Predicting the Development of Source Rocks in Carbonate-Dominated Settings – A Case Study from the Eocene Bou Dabbous Formation (Central and Northern Tunisia)	Alvaro Jiménez-Berrocoso , <i>Repsol</i> , et al.
11:30 - 11:55	Charge Analysis of Cretaceous Abu Roash F and Lower Kharita Petroleum Systems in the Beni Suef Basin (Egypt): An Integrated Petroleum Systems Study	Matthias Greb , <i>U. of Utah-EGI</i> , et. al.
11:55 - 12:20	South Atlantic Hydrocarbons Through Space and Time	Craig Schiefelbein , <i>GSI</i> ; William Dickson, <i>DIGs</i> ; John Zumberge, <i>Geomark</i> and James Brooks, <i>TDI Brooks</i>
12:20 - 13:30	Lunch and Posters	
13:30	Session 4: Katrina Cotterill, <i>BHP</i> and Dave McLean, <i>Anadarko</i>	
	Theme 4 - Storage and Containment: New Insights in to Reservoirs, Traps and Seals	
13:35 - 14:00	Keynote: Fundamental Geological Observations on the East African Margin Based on Rock-rich Regional Studies (Kenya, Tanzania, Mozambique and South Africa)	Anne McAfee , <i>Core Laboratories Integrated Solutions, UK</i>
14:00 - 14:25	Re-evaluation of the Cretaceous-Palaeocene Depositional Model and Implications for Prospectivity, Offshore South Mozambique Basin	Hannah Crompton , Sarah-Jane Kelland and Gareth Williams, <i>ERCL</i>
14:25 - 14:50	The North African Carbonate Build-up Play: A New Trapping Style in the Levantine Basin of the Eastern Mediterranean	Neil Hodgson , Karyna Rodriguez and Paolo Esestime, <i>Spectrum Multi-Client UK</i>
14:50 - 15:15	Coffee and Posters	
15:15 - 15:40	Stratigraphic Pinch-Out Plays in a Hyper-Extended Domain: Sierra Leone and Liberia Margin, West Africa	Joan Flinch and Promod Painuly, <i>Repsol</i>
15:40 - 16:05	Top Seal Capacity Analysis and Observations: Learnings from our Global Catalog and Applications to Africa	Scott Wilkins , <i>Anadarko</i>
16:05 - 16:30	Detection of Vertical Hydrocarbon Migration Pathways: Implications for Seal and Charge Assessment in West Africa	David Connolly , <i>dGB Earth Sciences</i>
16:30	Awards and Closing Remarks	



The 15th HGS-PESGB Conference on African E&P



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Poster Session Agenda

East Africa	
Crustal Structure and Subsidence History of the East-Africa-Madagascar Conjugate Margins: Implications for Source Rock Maturity in Underexplored Offshore Basins	Dr. Paul Mann , Matthew Copley, <i>University of Houston, TX</i>
Inferences on the Structural Framework and its Influence on Drainage in the East African Rift System	Siebe Breed , Mike Oehlers, Mark Broadley, Rowan Edwards, <i>CGG</i>
Mesozoic and Cenozoic Island Connections in the Mozambique Channel	Yannis Bassias , <i>Amphor Energy</i>
Research on East African Catarrhine and Hominoid Evolution (REACHE): Reconstructing Early Miocene Paleobiology and Paleoenvironments from Across East Africa	Dr. Dan Peppe , <i>Baylor University</i>
The Beira High, Mozambique – Using High-Resolution Potential Field Modeling and Seismic Stratigraphy to Understand its Origin	Dr. Tim Ferriday , Giacomo Firpo, Nicola Eland, <i>ERCL LTD., UK</i>
The Nature of the Crust Offshore East Coast Africa – Can Geology and Seismic Ally with Potential Fields in the Search for Hydrocarbons?	Yannis Bassias , <i>Amphor Energy</i> ; Trond Christoffersen, Glyn Roberts, <i>Spec Partners Ltd.</i>
Pleistocene Stratigraphic History of Lake Tanganyika, and Influence of Upstream Rift Lakes Kivu and Rukwa	Dr. Christopher Scholz , Douglas A. Wood, <i>Syracuse University, NY</i>
Conjugate Margin – West Africa/South America	
An Integrated Stratigraphic Framework and Hydrocarbon Prospectivity of the Southern African Offshore Basins	Jean A. Malan , C. Davies, K. Gardner, E.A Hartley, E. Sutcliffe, J. Roux, S. Davids, A. Davids, C. Van Bloemenstein, J. Salomo, <i>Getech Group; Petroleum Agency South Africa</i>
Fine Tuning Quantitative, Plate-Tectonic Reconstructions of South Atlantic Conjugate Margins Using a GIS Compilation of Geologic and Geophysical Information	Andrew Steier , <i>University of Houston, TX</i>
Gravity Modeling of the Flexural Response of Loading of the Niger and Amazon Deltas onto Their Underlying Thinned Continental and Oceanic Crust	Rasheed Ajala , <i>University of Houston, TX</i>
Integrated Interpretation of Basement Structure in the Benin Basin Using Falcon Gravity Gradient Magnetic Data	Dr. Janine Weber , Gordon Shields, Peter Kovac, <i>CGG</i>
Paleogene Sandstone Deposition in the South Atlantic: Source to Sink, Structural/Tectonic Drivers and Emerging Play Potential	Scott E. Thornton , <i>The Burmah Oil Company Ltd.</i> ; Francis Inniss, <i>Panatlantic Exploration Company</i>
Refinements to Chronostratigraphy of Cretaceous Anoxic Events from the Southern South Atlantic Conjugate Margin (Falkland segment-Africa): Comparison of Six DSDP Sites	Dr. Sudeep Kanungo/Dr. Eiichi Setoyama , Eiichi Setoyama, David Thul, Matthias Greb, Gosia Skowron, Sabita Silwal, Christopher Kesler, <i>University of Utah</i>
Shallow Water Gabon: Overlooked Pre-salt Prospectivity	Neil Hodgson , Karyna Rodriguez, Anongporn Intawong, <i>Spectrum Multi-Client, UK</i>
South Atlantic Conjugate Margins: The Significance of Pre-Rift Western Gondwanan Orogenic Domains on Syn-rift Infill	Kyle Reuber , Dr. Paul Mann, <i>University of Houston, TX</i>
Tectonic Events of the Falkland Plateau – From Microplates to Rift Basins	Dr. Carmen M. Fraticelli , Donald Yezerski, Jessica Mercer, Yusri Yusri, Scotty Salamoff, Ujval Purohit, <i>Noble Energy Inc.</i>
The Deep Water Cenomanian/Turonian Systems in the Rio Muni Basin – Elements of an Emerging Play	Francis Inniss , Scott Opdyke, Merritt Smith, Peter Mullin, <i>Panatlantic Exploration Company</i>
The Mauretania-Senegal-Gambia Basin: Passive Margin Play Types and Hydrocarbon Opportunities in an Emerging Basins Offshore the Gambia	Hermann Lebit , <i>Erin Energy</i>
The Tectonic Significance of the Pre-Salt Wedge Along the Angolan Passive Margin: Implications on Rifting Style and Tectonic Processes	Gyorgy Marton , <i>Chevron</i> ; Greg Schoenborn, Gabor Tari, <i>OMV</i>
Validating New Satellite Seep Data with 3D Seismic, Angola & Gabon	William Jeffery , Michael King, Alan Williams, Gregor Duval, <i>CGG</i>
Width of the Rifted Zones of the Northwest Africa-Southeast USA Conjugate Margins as a Constraint on an Africa-North America Closed Fit Reconstruction	Naila Dowla , Dr. Paul Mann, <i>University of Houston, TX</i>
Miscellaneous Industry	
Why the Oil and Gas Industry Should Increase Investment in Petroleum Data Management	Moses Ekunu , <i>Coventry University, UK</i>

Monday, September 12, 2016

Westin Memorial City • 945 Gessner Road • Houston, Texas 77024
Social Hour 5:30–6:30 p.m.
Dinner 6:30–7:30 p.m.

HGS International Dinner Meeting

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

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

Pre-registration without payment will not be accepted.

Walk-ups may pay at the door if extra seats are available.

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

Andrew Nyblade

Department of Geosciences, Penn State
University and The School of Geosciences,
The University of the Witwatersrand,
Johannesburg, South Africa
nyblade@psu.edu

Imaging Basin Architecture with Passive Source Seismic Data: Results from Eastern and Southern Africa Using AfricaArray Data

AfricaArray (www.africaarray.org) is a multifaceted initiative to train the next generation of African geoscientists through coupled research and education projects. The initiative, now over ten years old, is defined by four core elements (1) a permanent geophysical observatory network of over 50 seismic and GPS stations spanning 17 African countries, primarily in eastern and southern Africa, (2) temporary, project-based broadband seismic networks for imaging Earth structure, (3) educational training for graduate students in Africa and the U.S., and (4) a program to enhance diversity in the geosciences in Africa and the U.S.

Seismic data from a number of AfricaArray projects are being used to obtain new images of basin and sub-basin structure across central, eastern and southern

Africa, providing new insights into the structure and origin of many basins. Examples include imaging the structure of the Cuvette Centrale in the D.R. Congo, where a new depo center in the northern part of the basin has been discovered, mapping the extent of Karoo basins

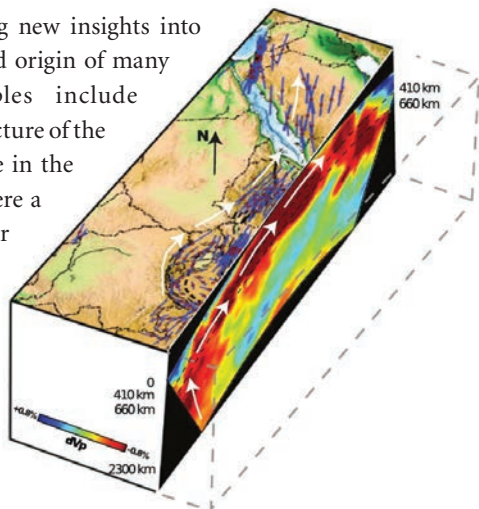


Image of the African superplume structure. The colors in the cross-section shows variations in P-wave speeds in the mantle beneath eastern Africa. The map shows seismic anisotropy estimated from shear waves, with the blue lines oriented in the fast polarization direction. The white arrows show diversion of flow of thermally perturbed mantle rock within the super plume. The superplume has led to rift formation in east Africa and had a first-order influence on basin architecture and hydrocarbon maturation.

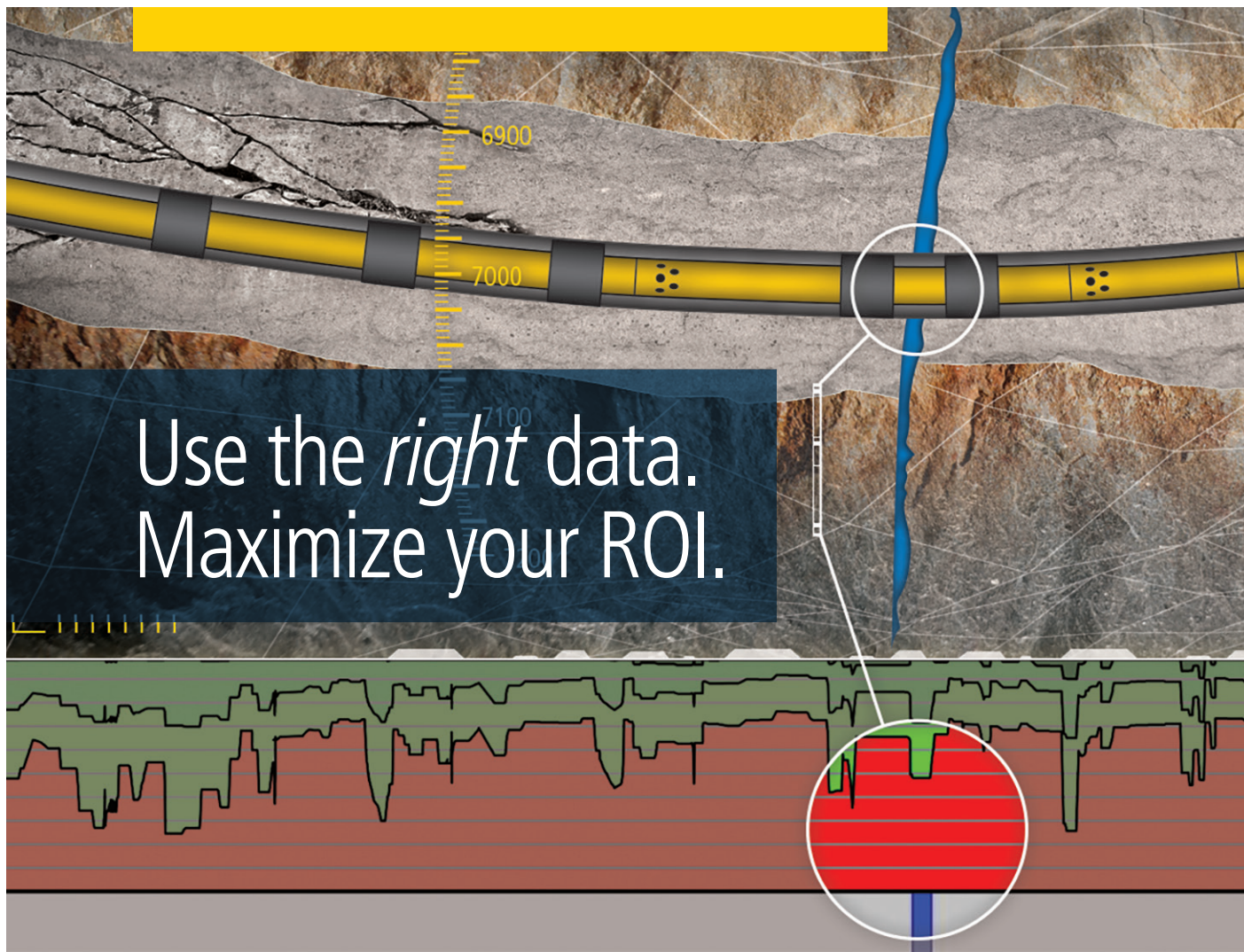
in southwestern Africa buried by Kalahari sands, determining the nature of the crust beneath the Mozambique coastal plain, where some models suggest the presence of oceanic crust, investigating the influence of magmatism on the northern Lake Malawi rift basin, and modeling the thickness of the crust beneath the East African passive margin. Seismic data are also being used to help understand regional-scale tectonics and its influence on basin formation and evolution. Seismicity and GPS studies have improved our understanding of plate kinematics and the spatial and temporal development of many rift basins in eastern Africa. Tomographic imaging of the upper mantle is providing new information about the location of thermal anomalies in the mantle and their influence on rift basin formation and rift propagation.

In this paper, results from these and other ongoing AfricaArray research projects focused on the structure and evolution of African sedimentary basins will be presented. ■

Biographical Sketch

DR. ANDY NYBLADE is Professor of Geosciences at Penn State University. He uses seismic recordings of earthquakes to interrogate earth structure in continental settings to understand deep earth processes linked to rifting, plateau uplift, volcanism, basin evolution, mountain building, crustal genesis and craton formation. For the past 10 years, he has led the AfricaArray initiative to build science capacity in Africa and the U.S. through coupled data gathering, research and education programs. He has worked extensively throughout eastern and southern Africa for over 25 years, where much of his research has focused on imaging African crustal and mantle structure.





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Tuesday, September 13, 2016

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

HGS Environmental & Engineering Dinner Meeting

Dr. Ty Ferré

*Department of Hydrology and
Atmospheric Sciences at the
University of Arizona*

Seeing Things Differently: Rethinking the Relationship Between Data, Models, and Decision-Making

Practicing hydrogeologists construct detailed numerical models to predict the responses of hydrologic systems to natural and applied stresses. These predictions form the basis for decisions that must balance optimal use of resources and ecosystem support. Increasingly, hydrogeologists are providing measures of the uncertainty of their predictions, often based on automated parameter estimation approaches. Dr. Ferré will build from the basic concepts of decision science to make the case that we are not providing the results that are most useful to support decisions in water resource management or contaminant transport and remediation. He will present a different approach to the construction and use of numerical models to support decision making. He will then encourage discussion and debate about the merits and limitations of this proposed approach. Finally, he will show that this new approach to hydrogeologic analysis also supports more efficient design of hydrogeologic investigations. ■

Biographical Sketch

DR. TY FERRÉ, a professor in the Department of Hydrology and Atmospheric Sciences at the University of Arizona, will present the 2016 Darcy Lecture. Dr. Ferré's research interests include the optimal use of indirect measurements (including geophysics) for hydrogeologic analysis. More generally, he is interested in the interplay between data collection and model-based quantitative analysis for scientific support of decision making in complex and contentious settings. He will deliver the talk to over 100 audiences, around the world, ranging from leading researchers, to practicing hydrogeologists, to stakeholders. The goal of the lecture is to foster a conversation about the role of science in general, and hydrogeology in particular, in public debates related to natural resources.



*...we are not providing the results that
are most useful to support decisions
in water resource management or
contaminant transport
and remediation.*



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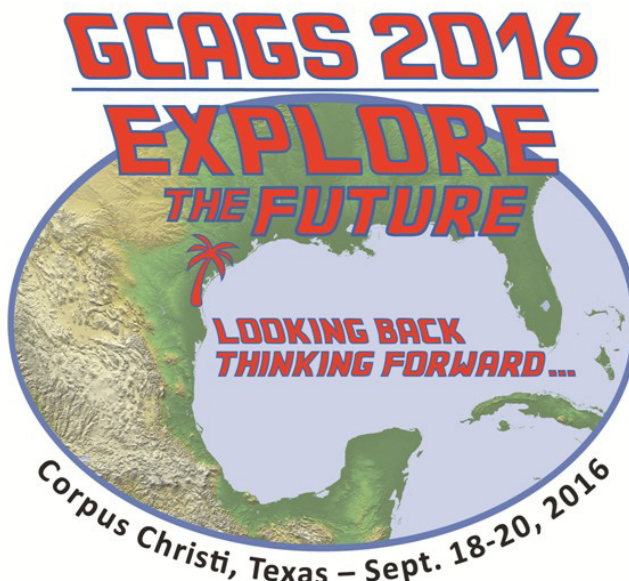
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- Understanding the Resource Plays; Conventional Carbonates & Clastics; Plate Tectonics; Uranium
- Reservoir Quality and Prediction; Reservoir Pressure Prediction
- Advances in Geophysical Technologies; New Methodologies; Geo-Education
- Mexico, Latin America, Caribbean
- Climate from Multiple Perspectives; Protecting and Stewarding Water Resources; The Changing Coastal Landscape

Field Trips

- Geology of Holocene Rio Grande Delta (2 days)
- Storm Signals in the Stratigraphic Record
- Ice Age Mammal Fossil Hunt
- Coastal geomorphology field trip from the Nueces River to the Gulf of Mexico, Celebrating South Texas History*
- Fulton Mansion Tour; Segway Tour of Corpus Christi Bay Front (Guest Activities)

Short Courses

- Depositional Environments from Well Logs*
- Basic and Advanced Methods of Biostratigraphy
- Geopressure and Prospect Risk Assessment
- Basic Seismic Attributes and AVO

*Short course/field trip combination compares ancient and modern clastic systems.

Estimated total attendee cost is less than \$950/person, including early registration, hotel, food, & travel from Houston or San Antonio.

Monday, September 26, 2016

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

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

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

Pre-registration without payment will not be accepted.

Walk-ups may pay at the door if extra seats are available.

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

Joint HGS General and North American Dinner Meeting

Arthur E. Berman

Director, Labyrinth Consulting Services, Inc.

Oil Prices Lower Forever? Hard Times in a Failing Global Economy

Two years into the global oil-price collapse, it seems unlikely that prices will return to sustained levels above \$70 per barrel any time soon or perhaps, ever. That is because the global economy is exhausted.

The current oil-price rally is over as I predicted several months ago and prices are heading toward \$40 per barrel. Oil has been re-valued to affordable levels based on the real value of money. The market now accepts the erroneous producer claims of profitability below the cost of production and has adjusted expectations accordingly. Be careful of what you ask for.

Meanwhile, a global uprising is unfolding. The U.K. vote to exit the European Union is part of it and so is the Trump presidential

candidacy in the U.S. and the re-run of the presidential election in Austria. Radical Islam and the Arab Spring were precursors and people want to throw out the elites who led the world into such a mess while assuring them that everything was fine.

The uprising seems to be about immigration and borders but it's really about hard times in a failing global economy. Debt and the cost of energy are the pillars that underlie that failure and the resulting discontent. Immigrants and infidels are scapegoats invented by demagogues.

It is telling that energy and its cost can hardly be found among the endless discussions about the economy and its failure to grow.

Joint HGS General and North American Dinner continued on page 25

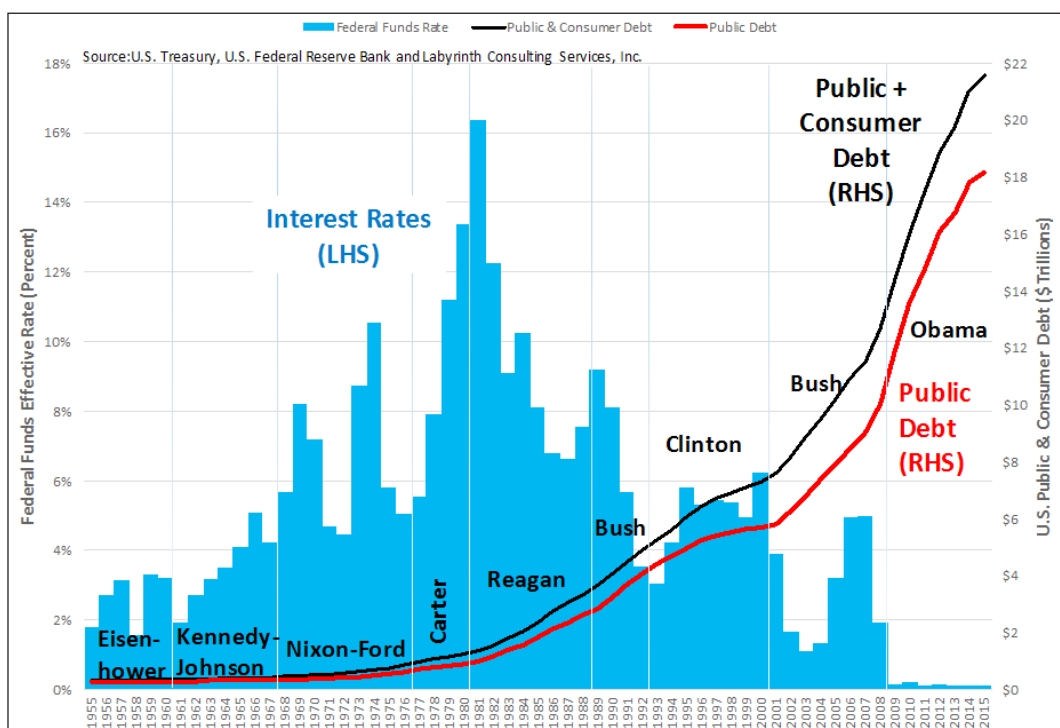
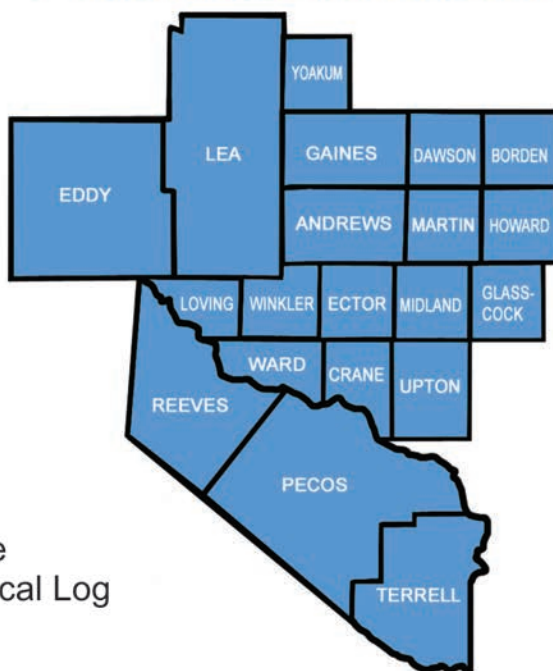


Figure 1. U.S. public and consumer debt and interest rates. Source: U.S. Treasury, U.S. Federal Reserve Banks and Labyrinth Consulting Services, Inc.



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AAPG Upcoming Education Events 2016

Geosciences Technology Workshop

Making Money with Mature Fields - Geosciences Technology Workshop

5-6 October 2016 | Houston, Texas

The goal of this workshop is to review mature fields and to identify the amount and nature of oil that can be recovered, and to evaluate competing strategies for economically producing the remaining reserves. In addition to looking closely at fields, we will review new and improved technologies that may help revitalize reservoirs and overcome problems such as low pressure, paraffin, corrosion, and more. We will identify companies willing to offer a "no money down" approach, or other forms of innovative financing. In addition to reviewing the technology, we will review case studies.



Short Courses

The Petroleum Geochemistry Toolkit for Petroleum Exploration and Development

3-4 October 2016 | Houston, Texas

This course will provide the geologist, geophysicist, and engineer with sufficient background to better understand the basic principles of petroleum geochemistry, how best to use geochemistry in their exploration or production program, types of samples and analysis required to evaluate a basin/region, integration with other datasets, and better understand the geochemical data and interpretation as well as limitations.

Carbonate Depositional Systems

3-4 October 2016 | Houston, Texas

The Carbonate Depositional Systems course is for earth scientists and engineers involved in exploration or production from carbonate rocks. This is an introductory course that assumes no pre-existing knowledge. It moves from basic principles to advanced ideas and case studies that will also help experienced geoscientists with practical aspects of carbonate depositional systems.



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Technology optimists have disparaged the existence of an energy problem since at least the 1950s. Neither unconventional oil nor renewable energy offer satisfactory, reasonably priced, timely solutions to the dilemma.

As political leaders and economic experts debate peripheral issues, the public understands that there is something horribly wrong in the world. It is increasingly difficult for most people to get by in a failing global economy and that is why there are political upheavals going on in Britain, the United States and elsewhere.

The British exit from the European Union adds another element of risk for investors. Lack of investment will inevitably lead to lower production, supply deficits and price spikes. These will further damage the economy.

The future for oil prices and the global economy is frightening. I don't know what beast slouches toward Bethlehem but I am willing to bet that it does not include growth. The best path forward is to face the beast. Acknowledge the problem, stop looking for improbable solutions that allow us live like energy is still cheap, and find ways to live better with less. ■

Biographical Sketch

ARTHUR E. BERMAN is a petroleum geologist with 38 years of oil and gas industry experience. He is an expert on U.S. shale plays and is currently consulting for several E&P companies and capital groups in the energy sector.



During the past year, he made more than 25 keynote addresses for energy conferences, boards of directors and professional societies. Berman has published more than 100 articles on oil and gas plays and trends. He has been interviewed about oil and gas topics on CBS, CNBC, CNN, CBC, Platt's Energy Week, BNN, Bloomberg, Platt's, *The Financial Times*, *The Wall Street Journal*, *Rolling Stone* and *The New York Times*.

Berman is an associate editor of the American Association of Petroleum Geologists *Bulletin*, and was a managing editor and frequent contributor to theoil drum.com. He is a Director of the Association for the Study of Peak Oil, and has served on the boards of directors of The Houston Geological Society and The Society of Independent Professional Earth Scientists.

He worked 20 years for Amoco (now BP) and 17 years as consulting geologist. He has an M.S. (Geology) from the Colorado School of Mines and a B.A. (History) from Amherst College.

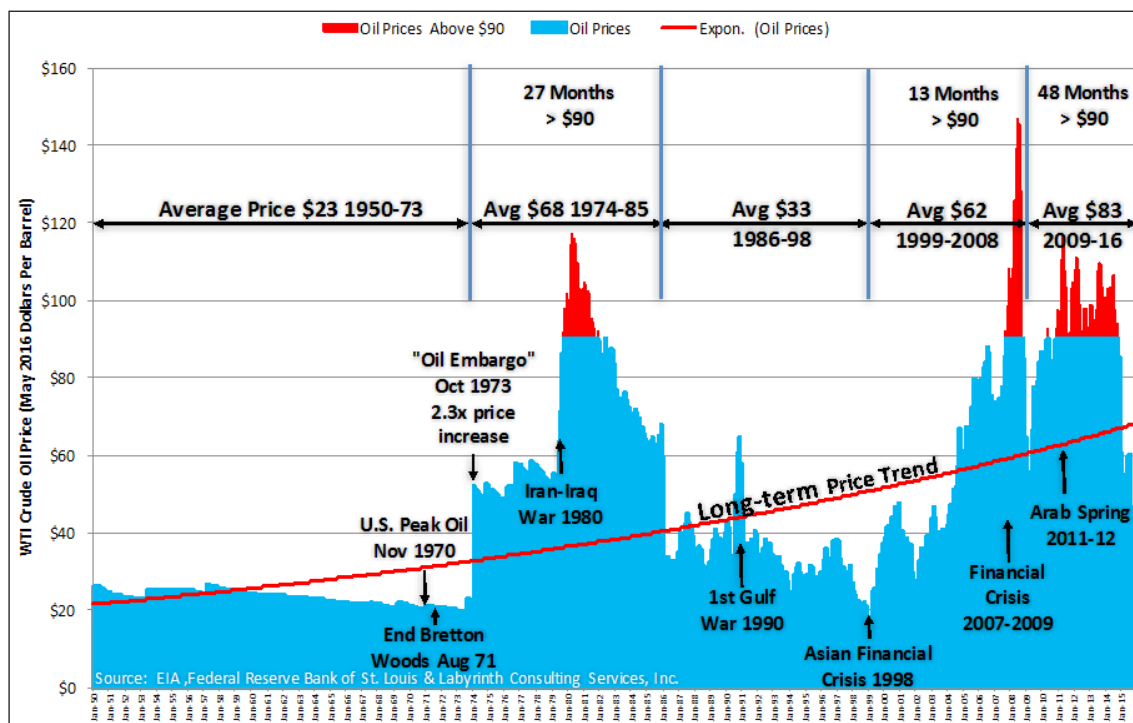


Figure 2. Oil Prices in 2016 Dollars, 1950-2016. Source: EIA, Federal Reserve Bank of St. Louis and Labyrinth Consulting Services, Inc.



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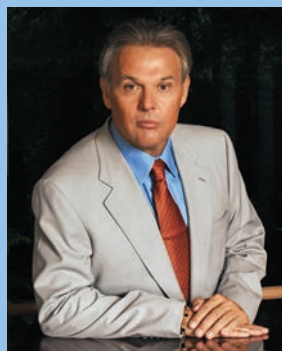
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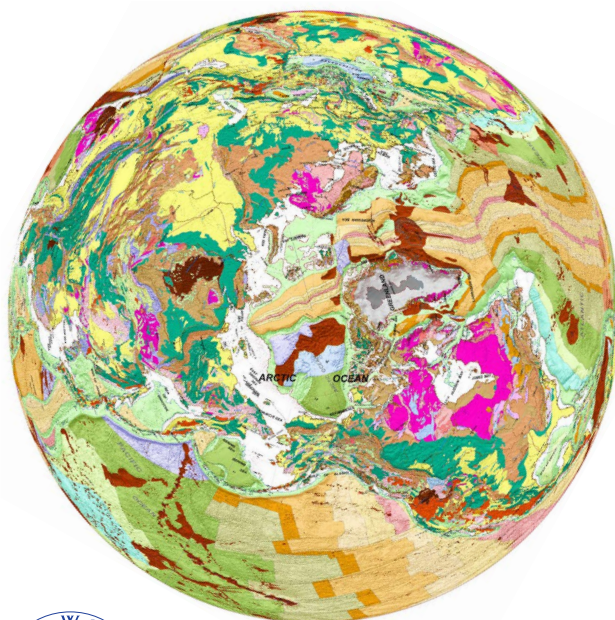
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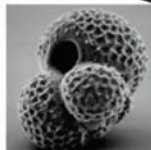
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Wednesday, September 28, 2016

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

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

To guarantee a seat, pre-register on the HGS website & pre-pay by credit card. Pre-registration without payment will not be accepted.

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HGS General Luncheon Meeting

Jonathan R. Rotzien
Basin Dynamics, LLC

HGS General Luncheon Meeting

Application of Global Outcrop Belts to Exploration and Field Extension in the Deep-water Paleogene Trend, Gulf of Mexico

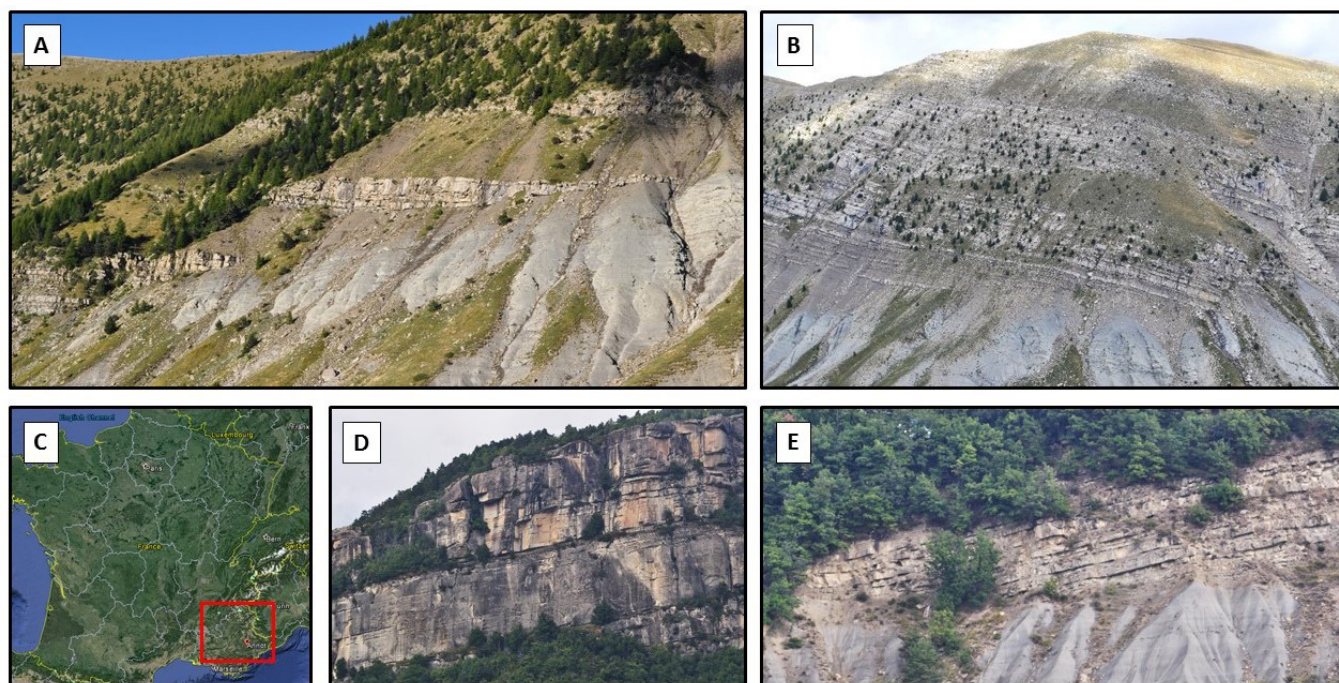


Figure 1. Depositional architecture and a variety of deep-water sandstone margins exposed in the Eocene Annot Sandstone, Southeast France. A) Southern margin of Le Sommet de Denjuan showing three overbank splays that onlap blue marl at the basin margin, B) Northern margin of Le Sommet de Denjuan showing a frontal splay complex overlain by a channel complex, C) Study area for the Annot Sandstone in Southeast France highlighted by the red box, D) Sandstone-on-sandstone channel margin, part of a larger feeder channel complex above the town of Annot, and E) Laterally continuous turbidite packages that onlap a steeply dipping basin margin ($>10^\circ$) near the village of Braux.

Exploration and field extension wells drilled in the Gulf of Mexico continue to face key geologic risks including reservoir presence and reservoir deliverability. In particular, the deep-water Paleogene Wilcox Formation shows a broad spectrum of lithofacies, depositional architecture, and reservoir quality over a stratigraphic interval exceeding 6000 ft in the thickest parts of the trend. Further, a number of industry-sponsored studies have argued that the depositional environment for this formation ranges from traditional leveed channels, to sandstone-rich lobes that lack distributary channels and conform to the shape of the underlying topography, to sandstone-poor overbank deposits that likely represent deep-water background sedimentation. Clearly,

there is room to enhance the understanding of the sedimentology, stratigraphic architecture, and reservoir characterization of target intervals in this trend.

One of the methods to better understand the uncertainty in Gulf of Mexico petroleum reservoirs is via the study of global outcrop analogues. This presentation features segments of three of the most thoroughly studied and classic deep-water outcrop belts from the West Clare Basin, Ireland, to the Paleogene basins of Southeast France, to the Cretaceous Great Valley Sequence of California, to highlight the stratigraphic complexities and

HGS General Luncheon continued on page 28

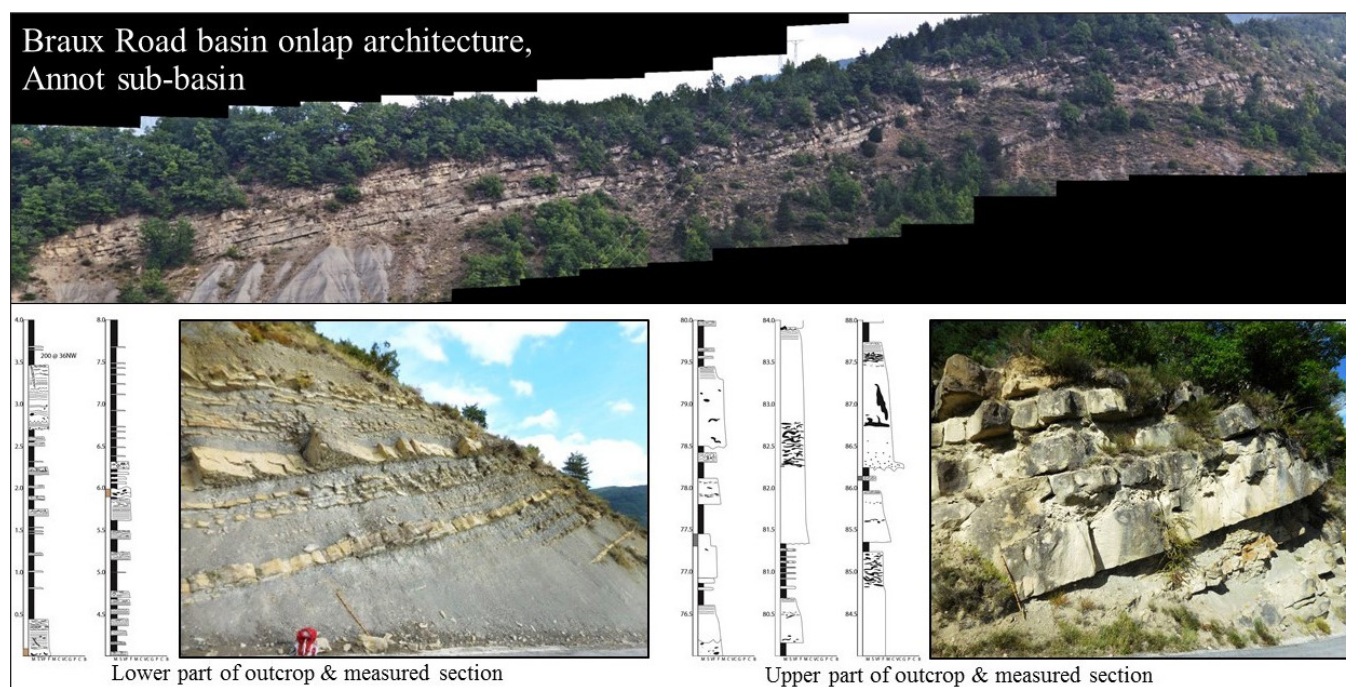


Figure 2. Photopanel at top, and sample measured sections of the Braux Road locale of the Eocene Annot Sandstone, Southeast France. The Braux locale features laterally continuous beds that abruptly onlap the underlying blue marl. The main lithofacies include thick-bedded sandstone, and medium- to thin-bedded sandstone and mudstone interpreted as the deposits of both high- and low-density turbidity currents. Some of these beds have mudstone-rich tops interpreted to represent deposition via transitional flow behavior (gray). This locale also has poorly sorted and contorted medium- to thick-bedded mudstone-rich deposits interpreted as the products of cohesive debris flows (brown). Scale in lower pictures is 1.4 meters.

similarities of each system to the Gulf of Mexico. The history of exploration into these turbidite-dominated outcrops began well over a half century ago and inspired the famous work that led to the identification of Bouma and Lowe division terminology. Today, these systems remain relevant as reservoir analogues for petroleum provinces and will continue to be useful for years as the nature of industry challenges evolve.

Despite decades of research, two important questions have not been solved using the deep-water outcrops in Ireland, France, and California. Using a core drilled through these outcrops, (1) can depositional environment be distinguished and lateral bed continuity be estimated using a process sedimentology approach, and (2) can deep-water sandstone margins be recognized and predicted? These questions address reservoir extent and reservoir quality using common core data that would be acquired in a routine drilling program. Characterization of high resolution stratigraphic data including grain size, sedimentary process, bed thickness, and bed length from previously unpublished sections in each system reveals the range of solutions to both questions as well as the applicability of the data in quantifying geologic risk and reducing uncertainty in modern Gulf of Mexico drilling programs. ■

Biographical Sketch

DR. JON ROTZIEN is President of Basin Dynamics, LLC. His expertise is the sedimentology and stratigraphy of deep-water depositional systems, basin analysis, and source-to-sink sediment transfer. Jon aims to solve key challenges in the exploration and production of petroleum, including reservoir presence and quality forecasting in frontier basins, and reservoir connectivity, distribution, and deliverability. Prior to his present position at Basin Dynamics, he was an exploration and appraisal geoscientist at BP. He received a PhD in Geological and Environmental Sciences from Stanford University and a BA degree in Geology from Colorado College. He has published peer-reviewed research papers and scientific conference proceedings pertaining to reservoir quality, reservoir characterization, petroleum geology, sequence stratigraphy, process sedimentology, basin analysis, and geophysics.



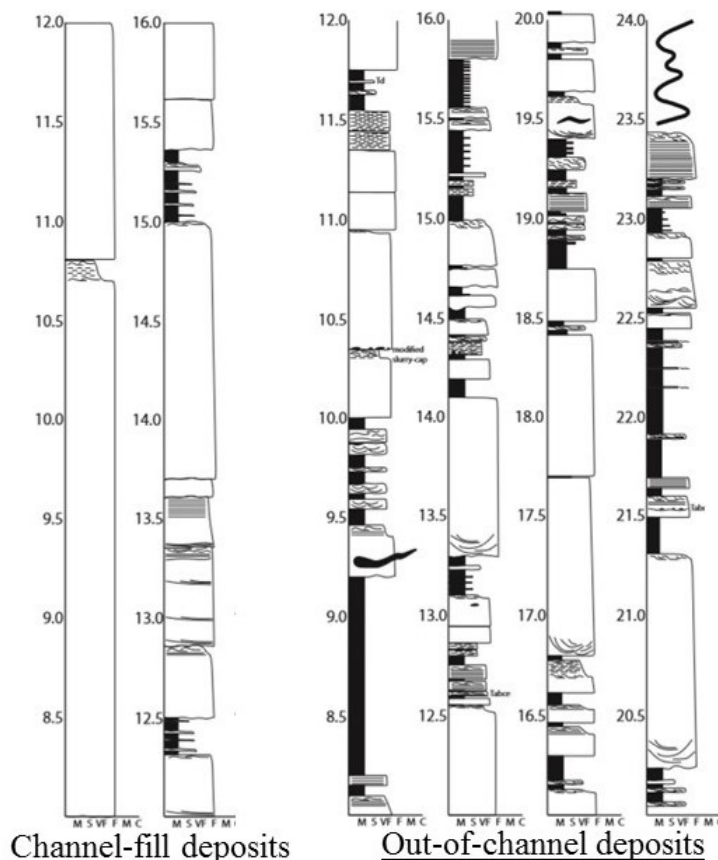
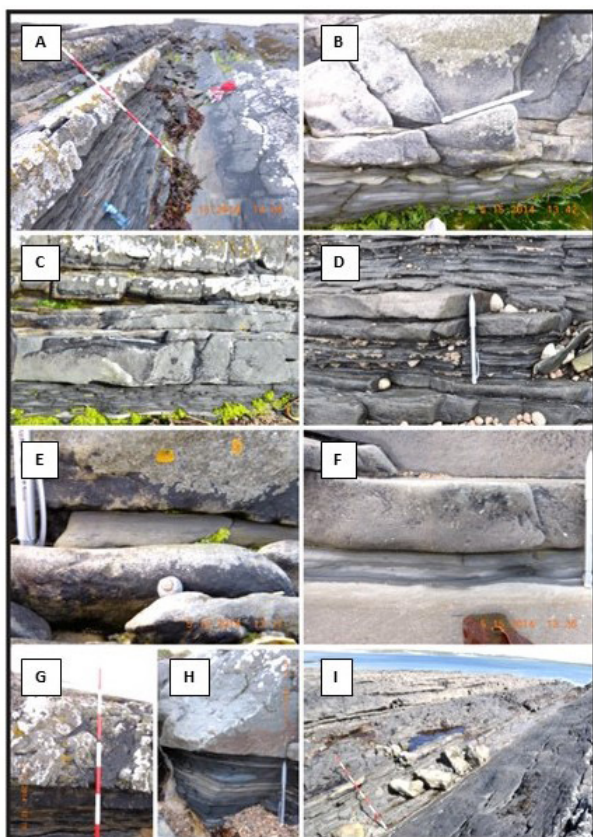


Figure 3. Photographs of Pennsylvanian Ross Sandstone beds in the vicinity of Rinevilla, County Clare, Ireland, and sample measured sections of channelized (8 m interval above middle) and non-channelized (16 m interval above right) intervals. The main lithofacies include thick-bedded sandstone, medium- to thin-bedded sandstone and mudstone, and mudstone. Some of the thick mudstone intervals show evidence of remobilization and deposition due to slumping or mass-transport processes. The majority of sandstone intervals exhibit diverse sedimentary structures, and include partial Bouma Ta-e sequences, as well as M and H divisions representing deposition via transitional flow. This observation implies a significant reinterpretation of the flows that deposited these beds, because historic research suggests these beds were deposited strictly via direct suspension sedimentation and do not show evidence for traction sedimentation. Red and white intervals on scale are 20 centimeters.

Internship Status at the Big Bend National Park

The Houston Geological Society (HGS) and the Big Bend Conservancy co-sponsored two geological/paleontological internships at the Big Bend National Park for summer 2016. The HGS received several excellent resumes from outstanding candidates between December 2015 and April 2016.

Amy Atwater and Eileah Sims accepted the geological/paleontological internships with the National Park Service at the Big Bend National Park. Amy is a graduate student at the University of Texas at Austin where she is in her 2nd year of studying mammal paleontology. Eileah is a student in geology at Texas A&M University and plans to graduate in May 2016. Eileah intends to continue her education and plans to earn a Masters and PhD in paleontology.

The interns will work directly with the Park Geologist and will help create and offer general public educational programs for schools and students for the new Fossil Discovery Exhibit (FDE) located in the Park. The FDE is scheduled for completion in September 2016. The interns will also help with ongoing research in the park and directly support the Park Geologist.

Amy and Eileah started their internships in mid-June and will complete their internships in mid-August. We are looking forward to hearing about their experiences in the Park. ■



Eileah Sims and Amy Atwater in Windows Viewpoint in the Chisos Basin in Big Bend National Park.

September 2016



S u n d a y

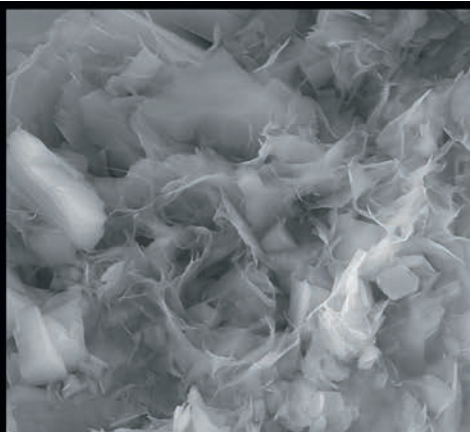
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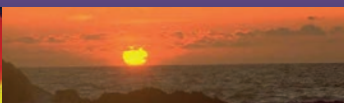
	Reservations: The HGS prefers that you make your reservations on-line through the HGS website at www.hgs.org. If you have no Internet access, you can e-mail office@hgs.org, or call the office at 713-463-9476. Reservations for HGS meetings must be made or cancelled by the date shown on the HGS Website 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.		
4	5	6 HGS Board Meeting 6 p.m.	7
11	12 HGS International Dinner & Africa Conference Opening Lecture Professor Andrew Nyblade, Page 19 2 Africa Conference Short Courses Pages 12-15	13 HGS –PESGB 15th Conference on African E&P The Westin Houston, Memorial City, Pages 10-19 HGS Environmental & Engineering Dinner Meeting Page 21	14
18	19	20	21
25	26 Joint HGS General and North American Dinner Meeting “Oil Prices Lower Forever? Hard Times in a Failing Global Economy,” Arthur E. Berman, Page 23	27	28 HGS General Luncheon Meeting “Application of Global Outcrop Belts to Exploration and Field Extension in the Deep-Water Paleogene Trend, Gulf of Mexico,” Jonathan R. Rotzien, Page 27

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GEOEVENTS

Thursday

Friday

Saturday



1	2 Don't wait, make your reservations online at hgs.org	3
8	9	10
15	16	17
22	23	24
29	30	Members Pre-registered Prices: Dinner Meetings members..... \$45 Emeritus/Honorary members..... \$40 Student members..... \$10 Nonmembers & walk-ups..... \$50 Except - Env. & Eng. \$30 Nonmembers & walk-ups..... \$35 Emeritus/Honorary members..... \$15

September 6-9, 2016
AAPG/SEG ICE
Cancun, Mexico

September 12-14, 2016
HGS-PESGB Africa Conference
Houston, TX

September 18-20, 2016
GCAGS Annual Convention
Corpus Christi, TX

October 3-4, 2016
AAPG Short Courses
Houston, TX (p. 34)

October 5-6, 2016
AAPG Geosciences Technology
Workshop
Houston, TX

October 7, 2016
GSH/HGS 15th Annual Saltwater
Tournament
San Leon, TX (p. 47)

October 8-16, 2016
Earth Science Week
Houston, TX (p. 6)

October 14-16, 2016
Take a Kid to the Outcrop
Trinity, TX (p. 36)

October 24, 2016
HGS Golf Tournament
Sterling Country Club and Houston
National Golf Club (p. 32)

Loyd Tuttle
loydtuttle@comcast.net

Bob Liska
liska.bob@gmail.com

Jim Thorpe
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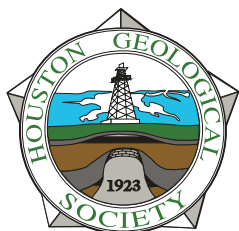
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HGS GOLF TOURNAMENT

Monday – October 24, 2016
Sterling Country Club and
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Come join us for golf, food, friends and fun at the annual HGS Golf Tournament at our new location, **Sterling Country Club** and **Houston National Golf Club** (www.sccathn.com). There will be prizes awarded for closest to the pin and long drive as well as many great door prizes for participants.

Entry Fee: \$175.00/Golfer or \$700.00/Team.

Early Bird Special: Sign up before September 30th to receive a discount of \$25.00/Golfer or \$100/Team.

Entry Deadline: October 14th.

Individual entries will be grouped with other individual golfers to make a foursome. Entries are limited to and will be accepted on a first-in basis.

Companies or individuals interested in sponsoring the event should contact Mark Dennis at 281-705-4346 or mdennis@petrolog.com. *Sponsorship deadline is October 14th.*

SCHEDULE OF EVENTS

8:00 – 9:45 a.m. Registration and free use of driving range
(Breakfast will be provided by
Petro Log International, Inc.)
10:00 a.m. Shotgun start
3:00 p.m. Cash bar, open buffet
3:30 p.m. Door prizes and awards presentation



REGISTRATION OPTIONS

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Team Captain _____ Phone _____ Amount Enclosed _____

Company _____ Email _____

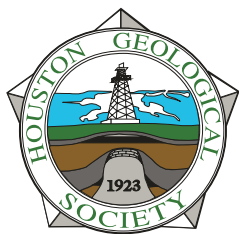
Billing Address _____

Credit card # _____ Exp. Date _____ Code# _____

Please Provide Email Addresses For All Team Members. All Communications Will Be Done Via Email.

Foursome Members (Please Print)	Company	Phone Number/Email	Hdcp/ Avg. Score
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____

*Please provide email addresses for **all team members**. All communications will be done via email.*



HGS GOLF TOURNAMENT

Monday – October 24, 2016
Sterling Country Club and
Houston National Golf Club

SPONSORSHIP APPLICATION

TREVINO SPONSORSHIP \$250.00

- **Sponsor Logo** signs on courses.
- **Company name** displayed on sponsor recognition board at registration and awards banquet.

HOGAN SPONSORSHIP \$500.00

- **Sponsor logo** signs on courses.
- **Company logo** displayed on sponsor recognition board at registration and awards banquet.



NICKLAUS SPONSORSHIP \$1,000.00

- **Sponsor logo** signs on courses.
- **Company logo prominently** displayed on sponsor recognition board at registration and awards banquet.
- **Company logo** displayed on driving range and practice putting green.

TITLE SPONSORSHIP \$2,000.00

- **Sponsor logo** signs on courses.
- **Company logo prominently** displayed on sponsor recognition board at registration and awards banquet.
- **Company logo** displayed on driving range and practice putting green.
- **Company logo** displayed on beverage carts.
- **Sponsorship includes tournament entry for one team (4 people).**

SPONSORSHIP REGISTRATION OPTIONS - Deadline October 14

Online: www.hgs.org/golftournament

Email: office@hgs.org

Fax: (281) 679-5504

Mail: Houston Geological Society, 14811 St. Mary's Lane, Suite 250, Houston, TX 77079

If paying by check, please make check payable to HGS Entertainment Fund.

Name _____ Phone _____ Amount Enclosed _____

Company _____ Email _____

Billing Address _____

Credit card # _____

Exp. Date _____ Security Code# _____

Please email your company logo to office@hgs.org and mdennis@petrolog.com.

Note: Company logos (high resolution file) must be received no later than October 14th.

If there are any questions, please contact Mark Dennis at 281-705-4346.



AAPG Upcoming Education Events 2016

Education

AAPG HEDBERG RESEARCH CONFERENCE CENTER

Mudstone Diagenesis: Implications for Exploration and Development of Unconventional Reservoirs

16-19 October 2016 | Santa Fe, New Mexico



The purpose of this conference is to foster the free exchange of new ideas among leading experts from industry, academia and government on the controls and impacts of inorganic and organic diagenesis on mudstone hydrocarbon generation, reservoir properties and seal quality.

This conference will promote the exchange of new ideas among the leading experts from industry, academia and government on the controls and impacts of inorganic and organic diagenesis on mudstone hydrocarbon generation, reservoir properties and seal quality.

Until recently, most researchers investigating shales concentrated their research efforts towards understanding: (a) hydrocarbon generation and expulsion, (b) seal capacity and (c) overpressure generation. Most data used to support these investigations were derived from organic geochemistry, relatively low magnification optical petrography and bulk rock characterizations. Notably lacking from these studies is the characterization and evaluation of the potential impact of mudstone diagenesis.

New analytical techniques in scanning electron microscopy (SEM) have allowed investigating mudstone properties down to the nanometer scale. New SEM observations of mudstone micro-texture have revealed the presence of authigenic cements, and have captured various stages of the transformation of organic matter during petroleum generation. An improved understanding of mudstone organic and inorganic diagenesis is required to advance the ability to better predict shale reservoir quality and heterogeneity.

GEOSCIENCES TECHNOLOGY WORKSHOP

Making Money with Mature Fields - Geosciences Technology Workshop

5-6 October 2016 | Houston, Texas



The goal of this workshop is to review mature fields and to identify the amount and nature of oil that can be recovered, and to evaluate competing strategies for economically producing the remaining reserves. In addition to looking closely at fields, we will review new and improved technologies that may help revitalize reservoirs and overcome problems such as low pressure, paraffin, corrosion and more. We will identify companies willing to offer a "no money down" approach, or other forms of innovative financing. In addition to reviewing the technology, we will review case studies.

Themes

- Mature fields: examples and profiles
- Typical issues resulting in oil left behind
- EOR
- New technologies and techniques
- Is there funding? Where? How? Who?
- Reality checks: water, environmental issues, infrastructure
- Opportunities and economies of scale: how to make the economics really work

E-SYMPOSIA AND ONLINE COURSES

Leadership and Strategic Thinking in the Oil and Gas Industry

This course will help you turn challenges into opportunities as you learn to strategically manage technological innovation, financial turmoil, a changing workforce, unpredictable social media, and tight deadlines.

Strategic Decision-Making: Current Issues in the Oil Industry

Learn to critically evaluate current issues that can impact growth and sustainability of oil and gas ventures.

Petroleum Exploration & Production: An Online Overview

This online course provides an overview of the petroleum industry from what is natural gas and crude oil to how to explore, drill, and produce oil and gas.

KNOWLEDGETTE

"New Bite Size, Interactive Learning" two months free to AAPG members.
www.knowledgette.com/

When members subscribe "Pro-annual", just use code "AAPG", then a 20% discount will be applied at check out.

SHORT COURSES

Carbonate Depositional Systems

3-4 October 2016 | Houston, Texas



This course will alternate between lectures and practical exercises involving cores, logs and seismic data.

The course starts with an introductory lecture that summarizes key differences between carbonate and Siliciclastic depositional systems, followed by a review of the Dunham classification of carbonate rocks and grain types. An exercise involving outcrop samples will allow participants to describe samples and relate them to depositional environments. The second lecture is on carbonate depositional environments, and it will systematically examine modern environments, outcrop equivalents, and subsurface reservoir examples of each environment. An exercise involving cores and logs will illustrate ramp depositional environments and their effect on reservoir architecture during "greenhouse" times.

Carbonate sequence stratigraphy will be discussed in theory and practice. A core-log-seismic exercise will show to how predictable variations in reservoir development occur during ice-house cycles on a shelf and isolated platform.

This course will conclude with a discussion summarizing prediction of depositional facies, stratigraphy and reservoir development in a variety of different settings.

The Petroleum Geochemistry Toolkit for Petroleum Exploration and Development

3-4 October 2016 | Houston, Texas



The petroleum geochemist's task is to determine if a regionally extensive source rock present, has the source rock reach sufficient maturity to generate large volumes of hydrocarbons, what type of hydrocarbons will be generated, timing of peak generation (current or historic), and migration of the generated hydrocarbons (trap access). These petroleum geochemistry elements and processes need to be understood to properly risk and high grade play both conventional and unconventional resource play opportunities.

This course will provide sufficient background to better understand basic principles of petroleum geochemistry, how best to use geochemistry in their exploration or development study area, determine the limitations of geochemical data/interpretation, and types of samples and analysis required to evaluate a basin, region, play, or well.



In Conjunction with AAPG | SEG 2016 International Conference & Exhibition (ICE)

ICE SC 08 | Salt Tectonics of the Gulf of Mexico (AAPG)

10-11 September 2016 | Cancun, Mexico



This course is intended for geoscientists, engineers and managers who need an introduction to salt tectonics or an update in this constantly evolving field. It is appropriate for those working in any salt basin globally and assumes a basic familiarity with structural geology concepts and terminology.

This two-day short course will provide an overview of salt tectonics in the Gulf of Mexico (GoM), including both the U.S. and Mexican portions of the basin. It will cover a range of topics ranging from the fundamental mechanics of salt-related deformation to the regional distribution of different structural styles, including relevant aspects of extensional, contractional, vertical and allochthonous salt tectonics. It is intended for geoscientists with different levels of expertise, from those new to the GoM or salt tectonics to those with years of experience in exploring in this complex basin.

www.aapg.org/career/training/



Guest Night Blasts into Lunar Orbit with Moon Science

by Linda Sternbach and Pete Emmet

HGS Guest Night at the Houston Museum of Natural Science on June 11 enthralled 320 HGS members and their friends and family. Dr. David Kring of the Lunar and Planetary Institute, Houston, gave a detailed and insightful lecture in the Big Screen Theatre. He talked about origin of life on Earth over 3 billion years ago, and how the moon's craters could unlock scientific secrets to solve the questions of life in the solar system. Attendees saw a high resolution planetarium show in the Burke Baker Planetarium about "Dark Matter" in the universe and then enjoyed a buffet dinner among the dinosaurs and reptile fossils in the Dinosaur Hall. HGS President-Elect **John Jordan** introduced young high school students who won poster contests at the annual Engineering and Science Fair. Michela Bracci of McCullough Junior High School, Conroe ISD, talked about her poster "SOS: Save Our Shores." HGS is pleased to support young scientists at events like Guest Night.



John Jordan gives student an award

Thanks to our corporate sponsors for financial support: BHP Billiton, Thunder Exploration and Walter Light, TGS, Schlumberger and Star Creek Energy. The Guest Night committee includes the new chair, **Peter Emmet**, and past Guest Night chairs **Charles Sternbach**, **Dave Reynolds** and **Linda Sternbach**, with help from **Lisa Emmet**, **Bonnie Milne-Andrews**, **Susie Reynolds**, and **Jim Andrews** on the night of the event. **Wayne Xu** of Schlumberger took photos of the event.

For information on Dr. David Kring's solar system research, check out the Lunar and Planetary Institute website <http://www.lpi.usra.edu>

Dr Kring's Guest Night talk on the Moon is ready to view on the HGS YouTube Channel named HGSGeoEducation. Look at this link - <https://www.youtube.com/user/HGSGeoEducation>

Or the direct link https://www.youtube.com/watch?v=SAB_iI4nX08. You can see the opening awards ceremony at <https://www.youtube.com/watch?v=ACk07dzYyww>. ■



HMNS Dinosaur Hall and guests



Linda Sternbach with David Kring

HGS Presents:

Take a kid to the outcrop family campout!

**October 14-16, 2016
Camp Cullen YMCA in Trinity, TX**

Come join fellow HGS members and their families for a weekend of fun! Activities include:

Interpreted quarry with hunts for fossils and petrified wood

Newly renovated geology lab with samples and flume

Gold panning

Zip line

Archery

Riflery

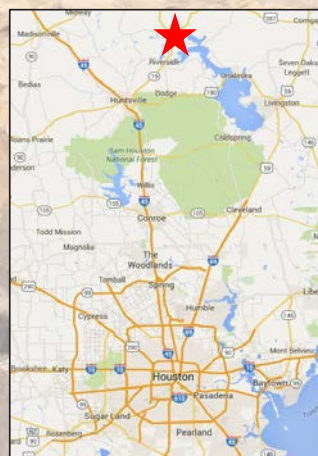
Arts & crafts

Marathon pipeline slide

Basketball

Gaga ball

Campfires



All of this and more, all only 1.5 hours north of Houston!

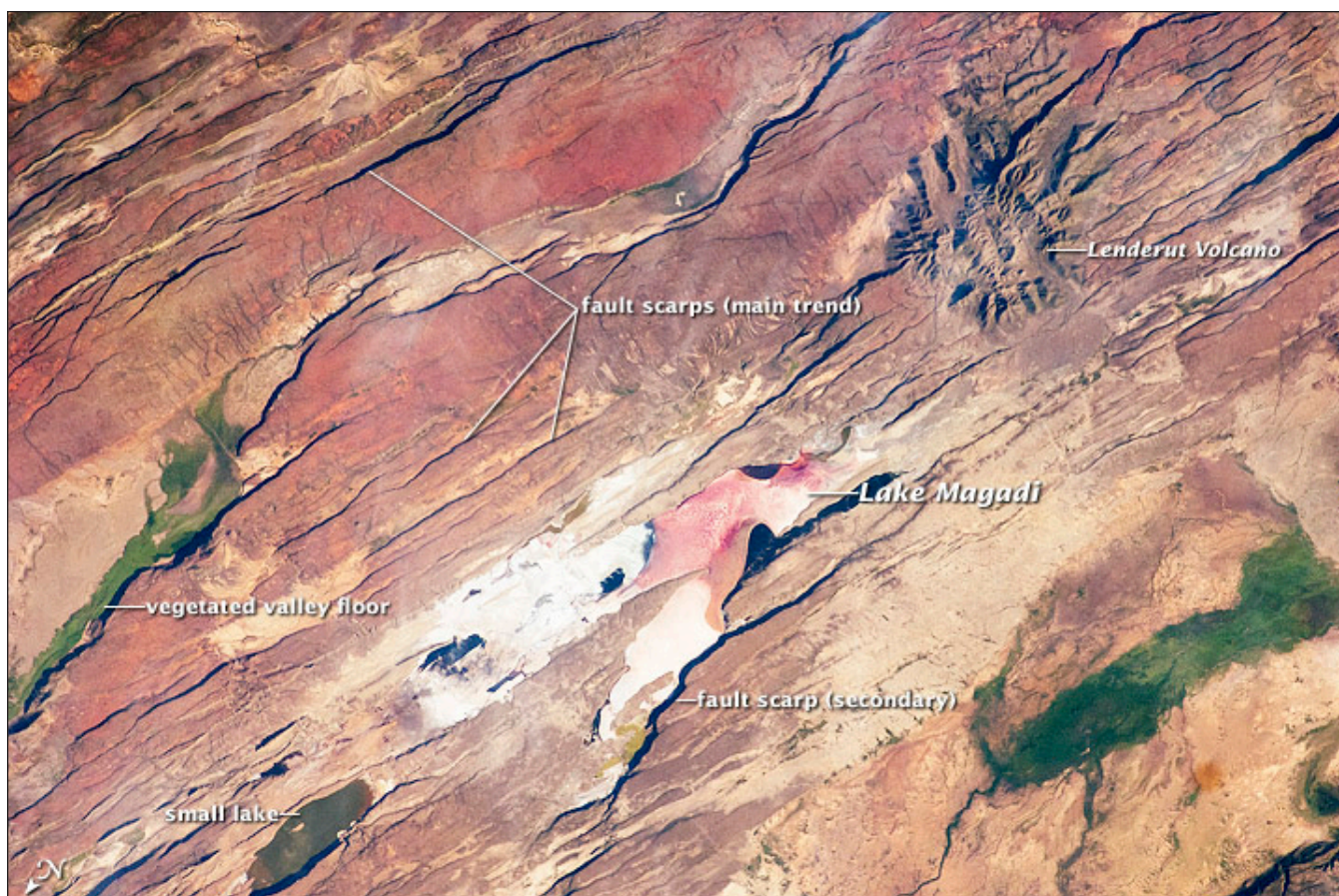
Check in Friday evening and check out Sunday morning. Cost is \$99/person for up to 4 people. For families of 5+, call for a discounted rate. The fee includes overnight stay Friday and Saturday nights, 4 meals and all activities. Each family will have a private bunkhouse for up to 8 and private family bathroom in newly renovated cabins. For more information on the facilities, please visit the Camp Cullen website at <https://www.ymcacampcullen.org/>

**Reserve your spot today! Reservations accepted through
September 30.**

Call Andrea at the HGS office at 713-463-9476

About the Cover: East African Rift Valley, Kenya

About the Cover: East African Rift Valley, Kenya



Astronaut photograph of the Eastern Branch of the Rift (near Kenya's southern border) highlights the classical geologic structures associated with a tectonic rift valley. The most striking features in this view are the numerous, nearly parallel, linear fault lines that occupy the floor of the valley. (Note that the image is oriented so that north is to the lower left.)

The East African Rift is one of the great tectonic features of Africa, caused by fracturing of the Earth's crust. On one side of the rift lies the Nubian (or African) tectonic plate, which includes the older continental crust of Africa. The Somali plate—which is moving away in the other direction—lies to the other side and includes the Horn of Africa. Together with the associated Ethiopian Rift, the tectonic boundary stretches from the southern Red Sea to central Mozambique.

Shadows cast by the late afternoon Sun make the fault scarps more prominent. These steps in the landscape are caused by slip

motion along individual faults and are aligned with the north-south axis of the valley (lower left to top right). A secondary trend of less linear faults cuts the main fault at an acute angle, with the fault steps throwing large shadows.

The East African rift system is marked by substantial volcanic activity, including lavas erupted from fissures along the rift in the region. Much of the faulting observed in this image cuts through such lavas. Elsewhere along the rift system, individual volcanoes form. Some of those volcanoes are very large, including Mount Kilimanjaro and Mount Kenya. In this image, a volcano (Lenderut) appears to be superimposed on the faults, indicating that it is younger than the faults it covers. Deeply eroded slopes also suggest that the volcano has not been active for a long time.

<http://www.earthobservatory.nasa.gov/IOTD/view.php?id=77566> ■

RENEW YOUR HGS MEMBERSHIP HGS.ORG

Houston Geological Society President's Night Award Dinner 2016

by Tami Shannon, Editor



The President's Night Award Dinner is held annually to distinguish the extraordinary efforts and contribution by our members, as well as recognize the generous support of our Corporate Sponsors. This year's event was held at the lovely Vic and Anthony's Steakhouse in downtown Houston. **Deborah Sacrey**, HGS President for 2015-2016, welcomed everyone and performed the honors of delivering several awards starting with the Corporate Star Awards.

Corporate Star Award honors companies who have made significant contributions to the Houston Geological Society. These contributions can be monetary (cash) or in kind (donation of venue, services, materials or an individual's time). Currently there are four levels of contribution. Platinum \$25K and over, Gold \$10K to 24,999, Silver \$2K to 9,999, Bronze \$500 to 1,999.

Corporate Star Awards

Anadarko - Student Initiative, Mudrocks

Chevron - Legends Night

Geophysical Insights - Legends Night

Baker Hughes - Mudrocks

Thunder Exploration - Guest Night, Legends Night, Mudrocks

Marathon Oil - Mudrocks

Weatherford - Mudrocks

Carl Zeiss - Mudrocks

GeoMark - Mudrocks

Shell Int'l E&P Inc. - Mudrocks

BHP Billiton - Guest Night

CSL Energy - Mudrocks

SM Energy - Mudrocks

EOG Resources - Legends Night

Apache Corp - Legends Night

INGRAIN - Mudrocks

TGS - Legends Night, Guest Night

Schlumberger - Guest Night

Oasis Petroleum - Mudrocks

Auburn Energy - Legends Night

Chairman's Awards

The Chairman's Awards honor members whose extraordinary efforts or unique contributions to their committee deserve special recognition.

Christina Calvin – For her work on the Applied Geoscience Mudrocks Committee. She has been an HGS member since 2013.

Wayne Camp – For his work on the Applied Geoscience Mudrocks Committee. He has been an HGS member since 2003.

James Macquaker – For his work on the Applied Geoscience Mudrocks Committee. Joe has been involved with HGS for years as a volunteer and is now a HGS member.

Thomas Reed – For his work on the Applied Geoscience Mudrocks Committee. He has been an HGS member Since 1999.

Bruce Woodhouse – For his work on the Applied Geoscience Mudrocks Committee. He has been an HGS member since 2002.

Justin Vandenbrink – For his work on the AAPG House of Delegates. He has been an HGS member since 2008, held Multiple HGS Board of Director positions as well as multiple Committee Chair positions.

Rising Star Awards

The Rising Star Award honors individuals who are relatively new to the HGS or have recently made significant and promising contributions to the enhancement and success of the Society.

Richard Germano – HGS member since 1980 and HGS Vendor Corner Chairman 2015-2016. Rich's role as Chairperson for the HGS Vendor Corner has enabled him to apply his extensive sales and marketing experience to the program. By instituting a new "4-Corners" program and periodic "themed-specials," participation in the program has risen steadily. Despite the hostile economic conditions in the industry, Richard's "4-Corners"



Jon Blickwede, outgoing Editor, delivered the Chairman's Awards



Deborah Sacrey and John Jordan

program resulted in a number of "Sold-out" Vendor Corners this year.

Firas Jarrah – HGS member since 2007, Firas volunteered many times at HGS events and he was part of leading geology field trips with Houston Geological Society in 2008 and 2009. Firas has been a constant volunteer for the General Luncheon and the International Group meeting for the past 5 years.

Ian McGlynn – HGS member since 2013. Ian is co-chair of the HGS Northsider's Committee. Ian is active in the HGS Mudrocks Committee and a member of AGU, GSA, SEPM, and MSA.

Sydney Weitkunat – HGS member since 2015. As Co-Chair of the Northsider's Committee Sydney has been instrumental in the logistics by helping to find speakers and working with the team at Southwestern Energy to ensure all meetings were successful.

Deborah Sacrey then proceeded to deliver other awards including the President's Award; several Distinguished Service Awards including the very heartfelt "Posthumous" Distinguished Service Award in recognition of Alison Henning's dedicated commitment to the HGS; and Honorary Life Membership Awards. She also recognized the departing of the 2015-2016 HGS Board and concluded her tenure by Passing the Rock Hammer" to 2016-2017 newly-elected President, John Jordan.

President's Award

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.

John Jordan – John Jordan rose above his role as President-

Elect. Early in the year, he got involved in hotel negotiations for the Africa Conference, allowing for "early-out" options in the planning process. This helped save the HGS thousands of dollars in a year. He did this again when it came to the Mudrocks Conference by negotiating with Anadarko to allow the HGS to use its venue as a cost-free alternative to historical venues.

Larry Quandt – Larry Quandt rose well-above his job as HGS Treasurer. He expertly kept the Board informed at every financial turn during our year, but on top of that volunteered to resurrect the Shrimp Peel. The HGS Board was looking for ways to allow our membership networking opportunities, and Larry – pretty much by himself – organized the Shrimp Peel at the Sam Houston Race Park. Despite having to operate on a "shrimp" budget, the event was very successful. In addition, Larry worked diligently on getting appropriate candidates for the Big Bend internship with the Park Rangers. Thank you, Larry!

Distinguished Service Awards

The HGS Distinguished Service Award honors members who have given long-term valuable service to the Society.

Bonnie Milne-Andrews – Bonnie Milne-Andrews has worked with the Houston Geological Society as a volunteer for over fifteen years. Through the years, she has volunteered with the International Explorationists group, HGS Guest Night, HGS Technofest and was a co-organizer for Legends Night III. Bonnie served two years as a Director on the HGS Board under the presidencies of Steve Brachmann and Linda Sternbach. Currently, she is Chair of the HGS Directory Committee. She has also served numerous terms as a delegate to the Houston Chapter of the AAPG House of Delegates and as Foreman of the Houston Chapter.

HGS President's Night Award Dinner 2016 *continued on page 40*



A Note from the HGS Office Staff to Mike Deming: Mike Deming has been a valuable volunteer to HGS for many years. In just the past two years he has helped with the heaving lifting and organization at all HGS conferences, helps out at the office several times per month, and most recently spent more than a week mucking out the flooded garage storage at the HGS office. We appreciate you tremendously, Mike. Thank you!

Sharon Choens – Sharon Choens serves as Chair for the Earth Science Week Committee and Chair of the Earth Science Celebration at the HMNS in October. She was Awarded the Rising Star Award in 2011-2012. She chaired the College/Pre-professional Subcommittee of the Educational Outreach Committee (2011-12). Sharon Graduated from Stephen F. Austin State University with a Bachelor of Science in Geology and followed that with a Master of Science in Geology from the University of Houston, CLC while working in the oil industry. Sharon is currently a geology professor at San Jacinto College – Central serving as Lead geology faculty.

Michael Deming – Mike Deming has served the Houston Geological Society in various capacities over the years. His volunteer work began in 1993 when he was Membership Chairman and he fulfilled that role until 1997. His service continued as the Poster Chairman in 2000. From 1997–1999, Mike was the HGS Treasurer-elect and Treasurer. He also served as HGS Vice President in 2013-2014 where he organized 13 technical dinner meetings. Recently he slogged in the HGS Basement cleaning the mess caused by the recent flood in Houston. The society would like to recognize Mike for these service efforts, but in particular for his work as Awards Chairman from 2004-2016. During this period, he has never let the society, a guest speaker, or an annual awardee go without proper recognition. Mike strives to ensure that award inscriptions are perfect. This kind of service helps make the HGS a coherent and active society. The consistency and respect for our speakers and the reliability of volunteer efforts from Mike are what makes him the recipient of the 2016 Distinguished Service Award.

Tom McCarroll – Tom McCarroll has served as Skeet Shoot Chair for over 15 of the 34 years since the first skeet shoot in 1982. His first year as chair was in 1989. Tom is a member of HGS, GSH, AAPG, SEG, and API and has served several terms as an AAPG Delegate, including a year as Foreman of the Houston delegation. He is a former Executive Director of HGS and has served on several GCAGS Convention committees. This is Tom's last year as Skeet Shoot Chairman, with his last skeet shoot held earlier today. We are truly going to miss him in this role.

Dianna Phu – Dianna Phu has been the Social Media committee chair since it was launched in July of 2010 and the committee has grown by leaps and bounds in terms of the numbers of followers.

Dianna has been involved in the following over the past 10 years:

- HGS Continuing Education Committee 2006-Present
- HGS Website Committee 2006-Present
- HGS Social Media Committee Chair 2010-Present
- AAPG DPA Gulf Coast Section Councilor Alternate – 2013-2016
- AAPG DPA Website Committee Chair & Social Media Contributor – 2013-Present
- Offshore Technology Conference Program Committee – Networking Subcommittee – 2014-Present (Vice-Chair 2015, Chair 2016)
- GCAGS 2015 Houston Convention Secretary
- GCAGS 2015 Houston Web Manager
- GCAGS Publicity Committee – Social Media Chair (2014-Present)

Robert Pledger – Since coming to Houston in 1976, Robert has been active in the Houston Geological Society as a Director, Vice-President and Chairman. He has been a member of the Continuing Education Committee since 1988, judge for the Imperial Barrel Competition, and docent at the Houston Museum of Natural Science. Robert enjoys volunteering for field trips and short courses and is active in the American Association of Petroleum Geologists and the Society of Independent Professional Earth Scientists where he volunteers on numerous committees. Most recently he was a guest speaker at Geoscience Day, sponsored by the HGS and GSH. Additionally, he was a field trip leader to Spindletop Field in 2014 with the AAPG and guest speaker at several AAPG sponsored seminars.

Sharie Sartain – Sharie Sartain joined HGS as an Active Member in 1983. She served as a Director on the HGS Executive Board from 1999-2001 and as Secretary during 2001-2002. During that time, she also acted as the Society's Volunteer Coordinator. After leaving the Executive Board, she chaired the Awards Committee for 3 years. Since 2009 Sharie has been Chairman of the Membership Committee, which reviews all new HGS



Accepting the Posthumous Distinguished Service Award for Alison Henning is her husband, Todd Henning and their two sons Mark and Jack Henning.

Membership applications and Emeritus status requests, then makes approval recommendations to the Executive Board on a monthly basis. Sharie received a Houston Geological Society President's Award in 2010 and the HGS Chairman's Award in 2015. She has been representing the HGS as a Delegate to the AAPG House of Delegates (HoD) since 1997. During 2008-2009 she was the elected Foreman for the Houston area AAPG HoD delegation where she served on several standing and ad hoc committees for the HoD.

Thom Tucker – Thom Tucker has been a member of HGS since 1986. His involvement with the HGS Continuing Education committee began when he attended the January 1995 monthly meeting. The Committee has coordinated and executed short-courses at GCAGS and AAPG conventions, the 2014 HGS-PESGB Africa Conference and currently has plans for the 2016 Africa conference. The HGS Continuing Education committee, for which Thom is currently serving as Chairman, has encountered significant challenges during the last 18 months. Thom, along with others on the committee, has worked tirelessly to secure free Corporate facilities to conduct short courses. The outcome has been 2 short-courses and a Symposium, within 2 months, in 2 new-to-us locations!

Alison Henning (Posthumous) – Alison Henning was a long-time HGS member and an active volunteer of the society. She enjoyed teaching geology to her students at Rice University and to other teachers as part of the Teachers Continuing Education Endeavor. She also enjoyed her professional career in the petroleum industry – most recently at BP.

As an active HGS member and volunteer:

- She served as the co-chair in the start-up years of Earth Science Week activities and was awarded a HGS Rising Star Award in 2001
- She helped organize and lead HGS activities at several CAST (Conference for the Advancement of Science Teaching) meetings

- In 2008-2009, she was a HGS representative on the Texas Board of Education to develop the earth science high school curriculum and fought valiantly to keep valid earth science in our schools
- As Director on the HGS Board in 2007-2009, she coordinated the Maps in Schools project and assisted in the selection of Teacher of the Year
- Alison was instrumental in the HGS community outreach Evergreen Cemetery Project in 2007
- She volunteered at the HGS booth during the school field trips to the Houston Gem and Mineral Society shows
- She served on the HGS Calvert Scholarship Committee

Alison will truly be missed!

Honorary Life Membership Award

The HGS Honorary Life Membership award honors members who have distinguished themselves in the science of geology or have contributed outstanding service to the success and welfare of this organization. (Also a prior recipient of the Distinguished Service Award.)

Janet Combes – Janet Combes has been a member of the HGS since she moved back to Houston in 1995. In addition to being active in numerous HGS committees, she served as an elected HGS Director in 2002-2004, was a member of the AAPG House of Delegates from 1999-2002, was a session co-chair at both the 1995 and 2006 AAPG conventions, and served on the planning committees for the 2008 GCAGS/GSA in Houston as chair of the teacher event. From 1999-2001, Janet served as Logistics Co-Chair of the new Earth Science Week committee and has remained on the committee since that time. Starting as a volunteer guide at the HMNS, Janet has been a member of the HGS Museum Committee since 1997. The HGS previously recognized Janet's contributions awarding her the Rising Star award in 2001, the President's award in 2006 and 2010, the Distinguished Service Award in 2008 and as Volunteer of the Month in February 2006. Recognitions by other societies include ECH Excellence in Education award in 2007 and the Texas Earth Science Teachers Association Recognition award in 2003.

Paul Hoffman – Paul Hoffman has served eight terms in AAPG's House of Delegates, including service on HoD's Honors & Awards Committee, Nomination and Election Committee, and Constitution and Bylaws Committees, which he chaired in 2007-2008. He chaired an Ad Hoc Constitution and Bylaws Committee for HGS and served as HGS Secretary, Director, Vice President, and finally as President in 2001-2002. He has chaired the HGS Ballot Committee since 2007 and served on the HGS Foundation Board since 2005. Paul is also a member of SIPES. Paul has been honored by HGS with a Speaker's Award, President's Award and Distinguished Service Award. The AAPG has also honored him with the House of Delegates Long Service Award and the AAPG Distinguished Service Award.

HGS President's Night Award Dinner 2016 *continued on page 42*

HGS President's Night Award Dinner 2016

continued from page 41



Departing HGS Board 2015-2016: Deborah Sacrey – HGS President, Gulce Dinc – HGS Secretary, Larry Quandt – HGS Treasurer, Jon Blickwede – HGS Bulletin Editor, James Grubb – HGS Director, Penny Patterson – HGS Director



Passing the Rock Hammer – Deborah Sacrey to John Jordan

John Jordan rounded out the event by presenting copies of the 2015-2016 HGS bound *Bulletins* as gifts to **Deborah Sacrey**, outgoing President and **Jon Blickwede**, outgoing Editor. He then recognized the incoming HGS Board for 2016-2017. **Deborah Sacrey** concluded the evening by saying farewell to her term as President and by thanking everyone. It was a splendid event!

Deborah's Farewell

"I know the HGS will be in very capable hands next year with John Jordan at the helm and looking after every dollar we spend. I want to thank the HGS office staff for keeping me organized and on track this year. I could not have done it without their help! I wish everyone a healthy, successful and prosperous next year. Farewell my friends!" ■



Incoming HGS Board 2016-2017: John Jordan – President, Mike Erpenbeck – Director 3, Tami Shannon – Editor, Sasha Gumprecht – Secretary, John Adamick – President-Elect, Mike Allison – Treasurer-Elect, Annie Walker – Director 1, Justin Vandenbrink – Director 4

RENEW YOUR HGS MEMBERSHIP
HGS.ORG

2016 HGS Skeet Shoot – The Changing of the Guard

The 2016 Skeet Shoot was held on Saturday, June 25, at the Greater Houston Gun Club in Missouri City. In spite of the heat, 63 shooters turned out to try their hands. Here are the results:

Trophy belt buckles went to:

High Overall Champion: Kevin Daugherty (47/50)

HOA Runner-up: Clark Walraven (46)

AA Champion: Amy Vanderhill (45)

AA Runner-up: Richard Fontenot (45)

A Champion: Steve Mitchell (39)

A Runner-up: Joe Landry (39)

B Champion: C.W. Macleod (29)

B Runner-up: Jeff Wu (29)

C Champion: Gregg Martinez (23)

C Runner-up: Fred Leblanc (23)

Lady Champion: Amy Vanderhill (45)

Lady Runner-up: Kari Anderson (20)

Amy Vanderhill and Tom McCarroll won the two-person flurry with a perfect 30/30 and took home \$100 gift cards from Academy as their prizes.

12 lucky raffle winners received \$50 gift cards: **Zane Stellakis, John Walker, Dawn Snyder, Sukhie Hyare, Peter Eick, Joe Landry, John Brown, Steve Mitchell, Matthew Burleyson, Glenn Rayfield, Kari Anderson, and Dietrich Landis.**

Depressed financial times in the industry made finding sponsorship a real challenge this year, but we have some true-blue friends of HGS and the Skeet Shoot that made sure we had the support we needed for the success of the event: **Bennu Oil & Gas, CLF Resources, Petrophysical Solutions, Inc., Schlumberger and Chemostrat** all made sponsorship contributions and **John Walker** made a personal donation of gift cards for the door prize raffle. **Merrick Mainster** once again provided cold beer once the shooting was over to wash down the excellent barbecue lunch from Old Hickory Inn. Thanks to all of you for supporting the shoot!

2016 marked **Tom McCarroll's** last year as Skeet Shoot Chairman; next year's chair will be **Gready Hunter**. Gready is a former HOA Champion of the shoot, and he's looking forward to taking it to new heights in the coming years. ■



Tom McCarroll and Gready Hunter

2016 – 2017 Houston Open Enrollment Course Schedule

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Stephanie Nwoko

Andrew Pomroy

Mamdouh Shebl

Megan Williams

EMERITUS MEMBERS

Thomas Cool

Ferruh Demirmen

Norman Kent

Radford Laney

Robert Novak

James Tholen

STUDENT MEMBER

Mario Gutierrez

New Members Effective June 2016

ACTIVE MEMBERS

Jose Alejandro

Eric Beard

Frank Bowers

Christian Dohse

Kristopher Farmer

Joseph Hayden

William Horner

Jennifer King

Adam Majeski

Gyorgy Marton

Timothy McMahon

Charlton Miller

Edwin Ntasin

Dan Rybczynski

Marel Sanchez

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Leyton Woolf

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Gready Hunter

EMERITUS MEMBERS

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Frank Brooks

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STUDENT MEMBERS

Catherine Henry

Elizabeth Horne

Waseem Khan

Eric Lunn

Maryam Nasizadeh

Luan Nguyen

Nicolas Quante

Lisa Tanh

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.

AGI Geoscience Policy Monthly Review (April 2016) **Bipartisan Energy Bill Passes Senate, Includes Provisions for Minerals and Data Preservation**

The Energy Policy Modernization Act of 2015 (S. 2012) passed the Senate with overwhelming support on April 20. The bipartisan bill, introduced by Senate Energy and Natural Resources Committee Chairman Lisa Murkowski (R-AK), is the first piece of comprehensive energy legislation to pass the Senate since 2005.

The bill focuses on improving and modernizing energy efficiency and infrastructure in the United States. If enacted, the bill would update the nation's electric grid, expedite natural gas exports, provide subsidies for hydropower and geothermal energy, and permanently reauthorize the Land and Water Conservation Fund (LWCF).

In addition to energy policy, S. 2012 also includes provisions for critical minerals and data preservation. Subtitle D—Critical Minerals recognizes the need for greater federal investments in minerals science and information, including provisions to strengthen our mineral forecasting capabilities, develop a methodology for criticality, and promote the responsible recycling of mineral materials. Subtitle D also includes a section reauthorizing the National Geological and Geophysical Data Preservation Program (NGGDPP), which expired in 2010.

The bill had previously been held up due to a series of controversial policy riders, including a proposal to expand offshore oil and gas development and another to provide an aid package to Flint, Michigan.

Members of Congress from both chambers will now go to conference to try to combine S. 2012 with its counterpart in the House, the North American Energy Security and Infrastructure Act, (H.R. 8), which passed the House in December 2015.

New House and Senate Bills Would Advance Nuclear Energy Technology

Two new bipartisan bills have been introduced in both chambers of Congress in an effort to expand the use of nuclear energy.

Sen. James Inhofe (R-OK) introduced the Nuclear Energy Innovation and Modernization Act (S. 2795) in the Senate on April 13, 2016 and Rep. Bob Latta (R-OH) introduced the

Advanced Nuclear Technology Development Act (H.R. 4979) in the House on April 18, 2016.

S. 2795 aims to reform the licensing process for nuclear reactors and restructure funding for the Nuclear Regulatory Commission (NRC) to encourage engagement with early-stage companies that cannot afford current NRC regulatory fees. H.R. 4979 would encourage more collaboration between the Department of Energy and the NRC by making NRC more accountable for developing a licensing framework to create advanced reactors.

At a hearing held for S. 2795, several witnesses from industry testified that NRC's current licensing process is a huge obstacle for many advanced reactor technologies and must be changed, with which the Senators agreed. NRC Administrator for Region II, Victor McCree, however, shared the agency's concern that the bill would require more time and resources than NRC had previously allocated.

A hearing for H.R. 4979 and the draft Nuclear Utilization of Keynote Energy Policies Act, sponsored by Adam Kinzinger (R-IL), was held by the House Energy and Commerce committee on April 29, 2016. Both bills received bipartisan support from the committee.

AGI Geoscience Policy Monthly Review (May 2016)

BOEM Five-Year OCS Plan Meets Opposition in Senate Hearing

The Senate Energy and Natural Resources Committee held a hearing on May 19, 2016 to discuss the Bureau of Ocean Energy Management's (BOEM) 2017-2022 Outer Continental Shelf (OCS) oil and gas leasing program. The proposed program calls for 10 lease sales in the Gulf of Mexico, three in the Arctic, and none in the Pacific or Atlantic OCS regions.

Opponents of the plan, including Committee Chair Senator Lisa Murkowski (R-AK) and Senator Bill Cassidy (R-LA), argued that it would negatively impact jobs and the economy, and potentially slow the progress the U.S. has made in decreasing its reliance on foreign oil imports. They were also upset over the Administration's decisions to limit the number of Arctic leases and to remove the Atlantic leases from the plan. Chairman Murkowski cited the 70 percent of Alaskans who support Arctic lease sales as an indication that the agency is biased in its evaluation of the region.

Government Update continued on page 46

Proponents of the plan, including Committee Ranking Member Senator Maria Cantwell (D-WA), argued that the limited leases were better for the environment based on the devastating impact of the BP Deepwater Horizon oil spill in 2010, a lack of updated navigation charts required for new leases, and their concern for the exposure of marine mammals to seismic surveys used in oil and gas exploration.

A video recording of the hearing can be seen at: <http://www.energy.senate.gov/public/index.cfm/2016/5/hearing-is-examine-the-bureau-of-ocean-energy-management-s-2017-2022-ocs-oil-and-gas-leasing-program>.

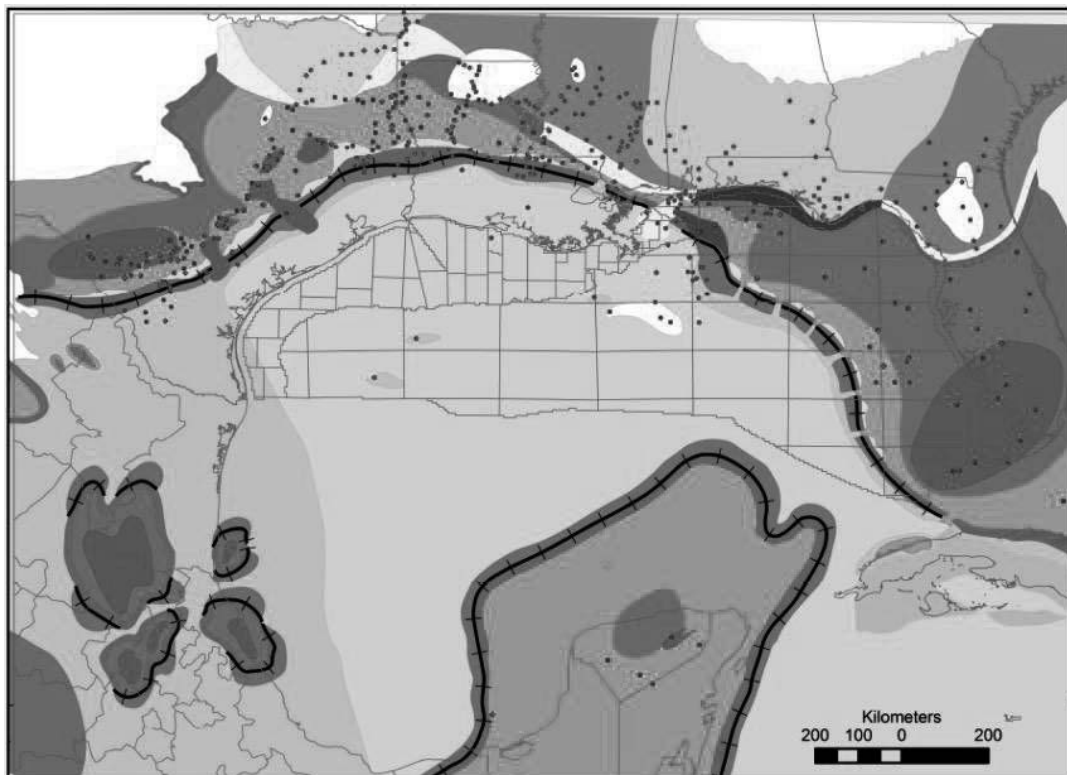
Kentucky and West Virginia Tapping into New Hydroelectric Power

Along the Ohio River in Kentucky and West Virginia, four dams originally built for passage of large ships in the 1960s and 70s are being retrofitted for hydroelectricity production. Scheduled to be completed by the end of 2016, the four dams are projected to produce 313 megawatts (MW) of energy. These dams will result

in an increase of hydroelectric output in WV by 15 percent, in KY by 32 percent, and the entire Ohio River by 130 percent.

These four retrofitted dams along the Ohio River are an example of how hydroelectric capacity is shifting in the United States. An April 2016 report (<https://www.eia.gov/electricity/monthly/update/index.cfm>) issued by the U.S. Energy Information Administration (EIA), expects 1083 MW of hydroelectric energy capacity to be installed between 2015 and 2019, with 422 MW of that coming from non-powered dams (NPDs), such as the four dams along the Ohio River that were not previously used to generate electricity.

The U.S. Department of Energy (DOE) released a report (http://energy.gov/sites/prod/files/2013/12/f5/npd_report_0.pdf) in 2012 on NPDs, claiming that NPDs have the potential to add 12 gigawatts (GW) of generating capacity to the entire U.S. portfolio, increasing hydroelectric power generation by 15 percent.



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AES Holds Briefing on Offshore Energy in the United States

The Advances in Earth Science coalition (AES), a consortium of professional geoscience societies and federal agencies, held a briefing on offshore energy in the United States. The speakers were Kristin Wood of Shell, Eric van Oort of the University of Texas at Austin, and James Bennett of the U.S. Bureau of Ocean Energy Management (BOEM). The briefing was moderated by Buford Pollett of the University of Tulsa.

Wood showed that global energy demand is projected to increase by 30% over the next 30 years, and that despite a probable threefold increase in renewable energy production, oil and gas will still meet the bulk of this demand. In his introduction, Pollett noted that 17% of U.S. crude oil production comes from offshore drilling, mostly in the Gulf of Mexico, making offshore oil and gas a major part of the U.S. energy industry for the foreseeable future.

Focusing on concerns in the aftermath of the 2010 Deepwater Horizon oil spill, van Oort detailed recent developments in drilling technology, well controls, training, containment, and safety. Notable attention was given to the new well control rule from the Bureau of Safety and Environmental Enforcement, which took effect on July 28, 2016.

Bennett summarized the progress of offshore wind energy in the United States. The first offshore wind farm in the United States will begin producing energy in late 2016 off the coast of Block Island, Rhode Island. BOEM has awarded 11 leases off the Atlantic coast, with upcoming additional leases off the coasts of Long Island and the Carolinas. Bennett explained that offshore wind energy off the Pacific Coast, where waters are deeper, will depend on advances in floating turbine technology.

EPA Releases Final Rule on Curbing Methane Emissions

The Environmental Protection Agency (EPA) issued three final rules earlier this month to reduce emissions of methane, volatile organic compounds (VOCs), and other air pollutants from new and modified existing oil and gas production sources. A vital component of the Obama Administration's Climate Action Plan is to cut methane emissions from the oil and gas industry by 40-45 percent by 2025; these three rules hope to help accomplish this goal.

The rules include provisions requiring a fixed schedule for monitoring leaks at well sites, the option to use innovative technologies to monitor leaks, and phased-in requirements to

Government Update continued on page 48

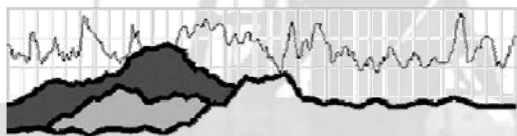
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use new “green completion” technologies for capturing emissions from hydraulically fractured wells.

Proponents of the rule include many environmental groups, who praise the EPA and the Administration for their efforts to reduce methane, a greenhouse gas 25 times more potent than carbon dioxide. However, congressional Republicans who opposed the rule claim that it ignores the progress industry has already made in making their own methane reduction rules. As such, Republicans within the House Committee on Appropriations, Subcommittee on Interior and Environment have included a provision in their fiscal year 2017 appropriations bill prohibiting the use of congressional funds to implement these new methane requirements. If passed, the bill would seriously undermine the Administration’s Climate Action Plan.

The bill still needs to be taken up and accepted by the full Committee before it can reach the House floor for a vote. The Senate has not yet released their version of bill.

DOE Awards \$4 Million in R&D Projects to Recover Critical Materials from Geothermal Fluids

The Department of Energy (DOE) has awarded \$4 million to four research and development (R&D) projects at the Lawrence Livermore National Laboratory in California, the Pacific Northwest National Laboratory Washington, the University of

Utah, and the University of Wyoming. The four projects will cover subtopics related to bioengineered microbes, magnetic nanofluids, and resource assessment, with the overall goal of assessing the amount of critical materials, such as rare earth minerals, that can be recovered from energy extraction fluids, and particularly from geothermal fluids.

Critical materials and minerals play a vital role in many clean energy technologies, such as the production of solar-voltaic cells, electric vehicles, and wind turbines. Rare earths are also critical to many defense activities.

This research is part of DOE’s efforts to secure supplies of critical materials, identify substitutes, and develop recycling procedures for the materials. These projects may enhance current applications of geothermal energy and support the development of geothermal projects.

COAST Act Would Help Protect Houston from Flooding

After floods hit the Houston area hard on April 17 and 18, 2016, forcing road and school closures and causing the death of eight people, Texas Senator John Cornyn (R-TX) recognized the need for better emergency preparedness in the region. Sen. Cornyn introduced the “Corps” Obligation to Assist in Safeguarding Texas (COAST) Act (S. 2856) less than a month after the devastating storms to begin developing a storm protection system.

Remembrance

JIMMY RICHEY KIRK
(1934-2016)

Long-time HGS member, **JIMMY KIRK** passed away on June 5, 2016. He was born in Okmulgee, Oklahoma to Juanita and Richey Kirk, grew up in Okmulgee and graduated from Oklahoma State University with a B.S. in geology. He entered the US Army in 1955. While serving in California, he met the love of his life, Julia. They married in 1958 and Jim began a long career as a petroleum geologist in the oil industry, retiring from Chevron Oil Company in 1991.

Jimmy is survived by his beloved wife of 58 years, Julia Kay Goolsby Kirk, his sister Ann Graham of Edmond, Oklahoma; his son, David Kirk; his daughter Mary Kay Kirk Hinkle of Montgomery, Texas; and his grandchildren Alton Kirk, Laura Kirk, Bradley Hinkle and Molly Hinkle. He is preceded in death by his parents and his sister, Sue Stein.

A memorial service was held on June 10th at St. Timothy’s Anglican Church.

Published in Houston Chronicle on June 19, 2016 - See more at: <http://www.legacy.com/obituaries/HoustonChronicle/obituary.aspx?pid=180358855#sthash.vuIQ0yWl.dpuf>. ■

The COAST Act would require the Army Corps of Engineers to coordinate with the Gulf Coast Community Protection and Recovery District (GCCPRD) to develop a storm protection plan for the area. The GCCPRD is in the second phase of a Storm Surge Suppression study while the Army Corps has long-standing flood prevention projects in the area, and the COAST Act aims to streamline the process by having the two groups work together.

The Houston and nearby Galveston urban areas are home to the country's fifth-largest metropolitan population as well as oil refineries and petrochemical plants. Their location puts them at high risk for flooding due to sea level rise.

The COAST Act has been referred to the Senate Environment and Public Works Committee where it will be considered before it can move to the full chamber.

New World Bank Report Outlines How Water Scarcity Could Impact Us in the Future

A new World Bank report titled "High and Dry: Climate Change, Water, and the Economy" highlights the importance of water for food, energy, and urban and environmental systems. The report projects that water scarcity will increase globally and impact economies, migratory patterns of populations, and create geopolitical conflict.

A key figure in the report estimates that by 2050 at a "business as usual" pace, water scarcity will result in a loss of 6% gross domestic product (GDP) in large number of sub-Saharan and northern African, Middle-Eastern, and Asian countries. Compared to a global scenario of efficient water policies put in place by 2050, northern Africa and the Middle East would still see a 6% loss.

The World Bank report recommends that nations adopt three general water policy priorities in order to combat the imminent

effects of water scarcity. The first is to optimize water use through planning and incentives. This would require better allocation of scarce water resources across sectors, as well as an increase in water efficiency within sectors. Second, water supply and availability must be expanded by investing in storage infrastructure and water recycling and reuse. And third, resilience must be addressed in order to reduce the impact of extremes, variability, and uncertainty of water resources. This would require better urban planning, risk management, and public engagement efforts.

Five Senate Bills Focus on Western Water

The Senate Energy and Natural Resources Subcommittee on Water and Power held a hearing this May to discuss a suite of water bills aimed at addressing the drought across the West.

Among the bills were S. 2533, introduced by Sen. Dianne Feinstein (D-CA), and S. 2902, introduced by Sen. Jeff Flake (R-AZ). S. 2533 would provide emergency drought relief to California by funding water supply projects, creating short-term changes to operations at existing water projects, and increasing water allocations to agriculture and cities in southern California. S. 2902 would update the Army Corps of Engineers' forecasting methods for better water supply management during droughts.

The Committee also considered bills introduced by Senators Cory Gardner (R-CO) and Harry Reid (D-NV). Sen. Gardner's bills would address revenues required to pay for the construction of the Fryngpan-Arkansas Project to provide water to rural Colorado communities, and resolve a water rights issue within a wilderness area in Colorado. Sen. Reid's bill would authorize funding for Colorado River projects to increase the water supply of Lake Mead.

All five bills still need to be passed out of committee before they have the chance of reaching the Senate floor. ■

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Remembrance

CYRUS STRONG V
(1932-2016)

HGS Past President and active member, **CYRUS STRONG V**, of Houston, Texas passed away on Thursday, the 7th of April 2016 after a year-long illness.

Cy was born on the 13th of November, 1932 in Cambridge, Massachusetts to the late John Dodge and Mary Inglis Strong of Hingham, Massachusetts.

Cy's grandfather was William Wallace Inglis of Scranton, PA, president of Glen Alden Coal Company, one of the largest coal mining companies of its time. To understand the importance of education, Cy often told of his grandfather making him work for a dollar a day in the mines. It was a lesson that he carried with him throughout his life.

Growing up in Belmont, MA, Cy attended Belmont Hill school. He graduated from Williams College in Williamstown, MA in 1954. After college, he entered the U.S. Army as a private and qualified for Officers Training school in Fort Benning, GA. Cy finished first in his class and joined the Engineer Corps. He spent three years in Germany with a small battalion in Dexheim (Rhine Hessen) building bridges across the Rhine. After his military service, he attended Rice University on the GI Bill and earned a Master's Degree in Geology.

Cy met Diane Helene Schwob, the love of his life, during his senior year of college at the Williams College Carnival in 1954. Diane was a senior at Middlebury College at the time. They married in Pleasantville, NY, in 1955.

After graduating from Rice, Cy was hired by Shell Oil Company where he worked in exploration throughout the world for over thirty years. While with Shell, he lived in Houston, New Orleans, Denver and back to Houston in 1973. He was very active in the Houston Geological Society and was president in 1992. Cy was an avid runner. He ran in scores of marathons, including Houston and New York multiple times, and was a member of the Houston Masters running club. He was inducted into the Houston Marathon's Hall of Fame in 2009 after many years of service on the Houston Marathon Committee as a board member, treasurer, course director and elite coordinator, among other positions.

Cy was an avid sailor and saltwater fisherman. He loved boats and being near the water. Cy enjoyed spending time in Bolivar, TX with his family where he and Diane had a beach house for many years. He loved playing tennis at the Houston Racquet Club in his younger years and golf in his later years at Hillsboro Club in Florida as well as Pine Forest Country Club in Houston. Cy and Diane enjoyed traveling. One of their favorite places was the south of France where they celebrated their sixtieth wedding anniversary last summer with family and friends.

Cy was preceded in death by his brother, John Dodge Strong, of Tulsa, Oklahoma and is survived by two sisters, Molly Dow of Vero Beach, Florida and Kathie Schlesinger of Brooklyn, New York. He deeply loved and was very proud of his four children: Gregory Strong and wife Alanna of Dallas, Pennie Casey and husband Ronnie of Fort Worth, Hilary Purcell and husband Tim of Houston and Andrew Strong and wife Denise of Houston. He also loved and adored his nine grandchildren and two step-grandchildren: Sam Strong; Josh, Stephanie and Valerie Ellis; Caroline, Connor and Mitchell Purcell; Alexa and Zach Strong, Lilly Leman and her husband Joseph and Reilly Ettinger.

Published in Houston Chronicle on Apr. 10, 2016 - See more at: <http://www.legacy.com/obituaries/houstonchronicle/obituary.aspx?pid=179566275#sthash.MMi8BifN.dpuf>. ■

AAPG House of Delegates Houston Geological Society

Term: 2013 - 2016

Delegates			Alternates (In order of Succession)
Robert Archer	Tarek Ghazi	Ronald Meers	Carl Steffensen
Bob Ardell	Gretchen Gillis	Kenneth Mohn	Kenneth Williams
Paul Babcock	Rusty Goetz	Clint Moore	David Kronman
Martha Barnes	Paul Hoffman	Don Neville	Michael Erpenbeck
Kara Bennett	Bill Howell	Robert Pledger	Riyad Ali-Adeeb
Martin Cassidy	Barry Katz	Rusty Riese	
Cheryl Desforges	Rosemary Laidacker	Patricia Santogrossi	
Craig Dinger	Steve Levine	Sharie Sartain	
John Dombrowski	Claudia Ludwig	Charles Sternbach	
Steve Getz	Evelyn Medvin	Justin Vandenbrink	

Term: 2014 - 2017

Delegates			Alternates (In order of Succession)
Sandra Barber	James Grubb	James Richards	Michael Erpenbeck
Steven Brachman	Inda Immega	Deborah Sacrey	Gerrit Wind
Denise Butler	John Jordan	Sarah Stanley	Joshua Woodworth
Marilyn Cisar	Alicia Kahn	James Tucker	Gabriel Guerra
L.G. Eubanks	April Parsons	Miriam Winsten	Ron Tingook
			Anthony Salem
			Sharma Dronamraju
			Sandro Mercio

Term: 2015 - 2018

Delegates			Alternates (In order of Succession)
	Lee Backsen		Meredith Faber
	Pat Gordon		Richard Ball
	Denise Stone		Scott Douglas
			Sean Kimiagar

Term: 2016 - 2019

Delegates			Alternates (In order of Succession)
Jeff Allen	Steve Getz	Evelyn Medvin	Claudia Ludwig
Robert Archer	Tarek Ghazi	Ronald Meers	Kenneth Mohn
Bob Ardell	Rusty Goetz	Bonnie Milne-Andrews	Hunter Lockhart
Kara Bennett	Gretchen Gillis	Clint Moore	Wayne Xu
Jennifer Burton	Paul Hoffman	Robert Pledger	David Kronman
Martin Cassidy	Mike Jones	Rusty Riese	Nabiel Eldam
Gary Coburn	Barry Katz	Patricia Santogrossi	Jaka Hardiwinangun
Cheryl Desforges	Rosemary Laidacker	Carl Steffensen	
Craig Dinger	Steve Levine	Justin Vandenbrink	
Kristen Fredrick	Bill Mathews		

At Large Delegates

John Amoruso	Larry Jones
Dick Bishop	Jeff Lund
George Bole	David Rensink
Paul Britt	Dan Smith
Martha Lou Broussard	Michael Sweet



HGS Bulletin Instructions to Authors

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

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

Figures, maps, diagrams, etc., should be digital files using Adobe Illustrator or Adobe Photoshop. Files should be saved and submitted in .ai, .eps, .tif or .jpg format. Send them as separate attachments via email or CD if they are larger than 5 MEGs each, accompanied by figure captions that include the file name of the desired image. DO NOT EMBED them into your text document; they must be sent as separate files from the text. DO NOT USE POWERPOINT, CLIP ART or Internet images (72-DPI resolution) as these do not have adequate resolution for the printed page and cannot be accepted. All digital files must have 300-DPI resolution or greater at the approximate size the figure will be printed.

Photographs may be digital or hard copy. Hard copies must be printed on glossy paper with the author's name, photo or figure number and caption on the back. Digital files must be submitted in .tif, .jpg or .eps format with 300-DPI or greater resolution at the printing size and be accompanied by figure captions that are linked by the file name of the image. The images should be submitted as individual email attachments (if less than 5 MB) or on CD or DVD.

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The *Bulletin* is printed digitally using InDesign. Call the HGS office for availability of ad space and for digital guidelines and necessary forms or email ads@hgs.org. Advertising is accepted on a space-available basis. **Deadline for submitting material is 6 weeks prior to the first of the month in which the ad appears.**

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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						
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Application to Become a Member of the Houston Geological Society

September 2016

Qualifications for Active Membership

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

Qualifications for Associate Membership (including students)

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

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

Annual Dues Expire Each June 30. (Late renewals – \$5 re-instatement fee)
Annual dues are \$28.00; emeritus members pay \$14.00; students are free.

Mail this application and payment to:

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Telephone: 713-463-9476 Fax: 281-679-5504

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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.

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☐ AAPG member No.: _____

Professional Interest:

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

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

School _____

Degree _____ Major _____ Year _____

School _____

Degree _____ Major _____ Year _____

Earth Science Work Experience _____

Applicant's Signature _____ Date _____

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

Name: _____

Signature _____ Date _____

Membership Chairman _____ HGS Secretary _____

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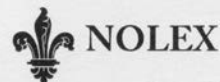
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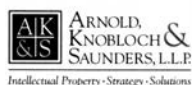
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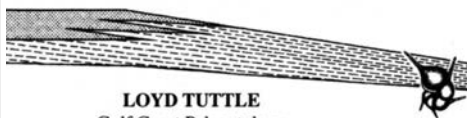
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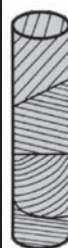


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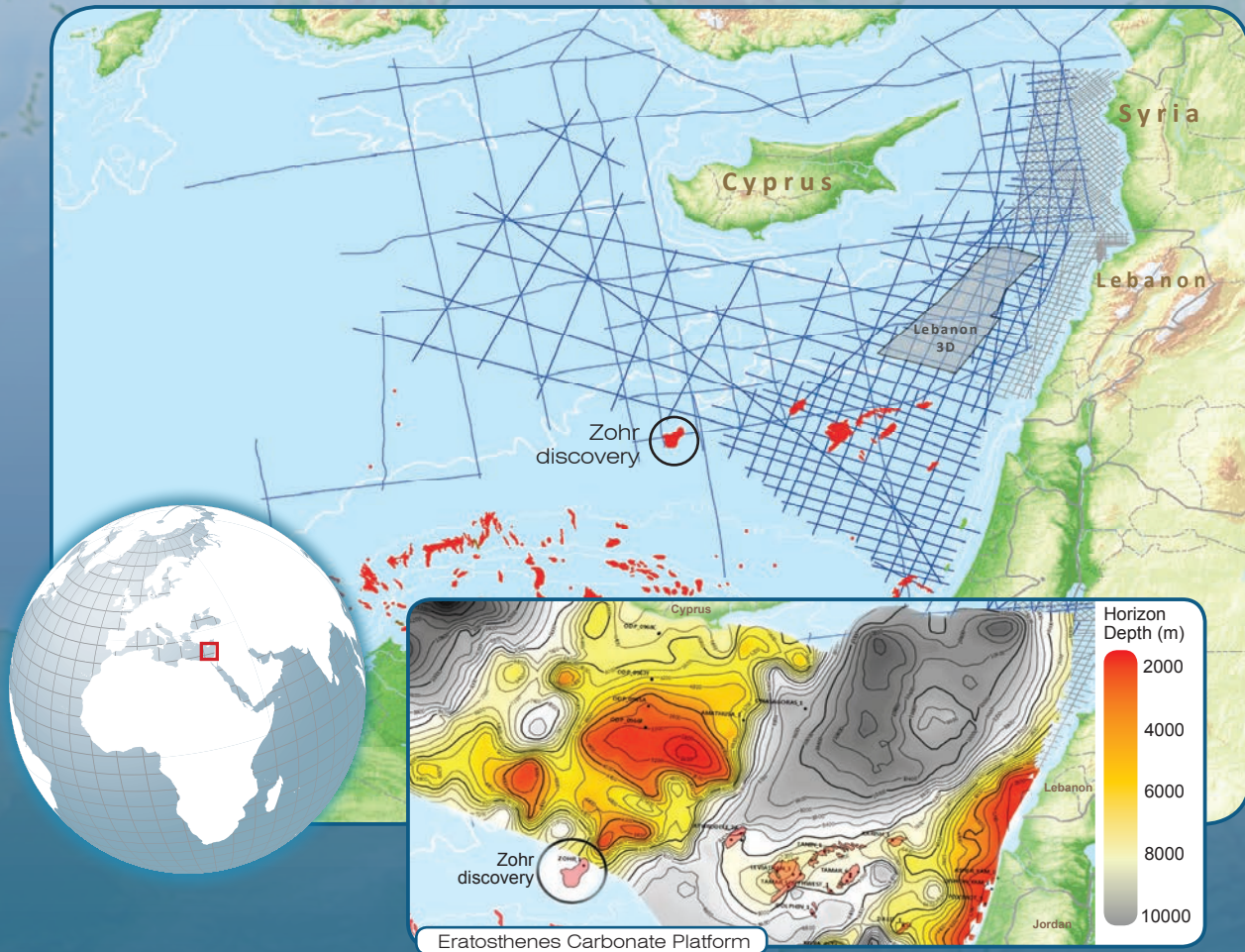
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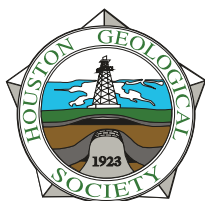
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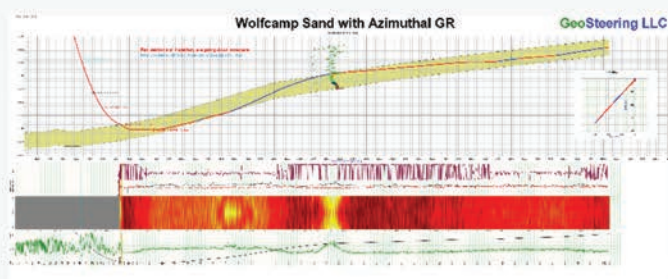
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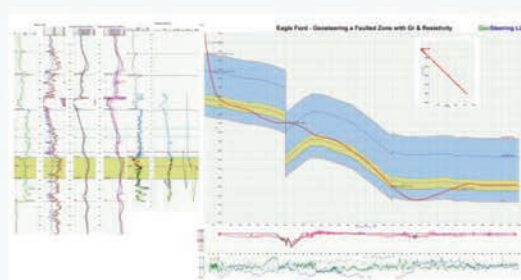
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