

BULLETIN

HOUSTON GEOLOGICAL SOCIETY



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GENERAL MEETING

Paleozoic Orogenesis of North America

HGS GOLF TOURNAMENT RECAP

by Jimmy Bagley, Golf
Tournament Co-Chair

HGS AT THE 2021 HGMS SHOW

by Janet Combes, Houston Museum
of Natural Science Co-Chair

AFRICA ENERGY FUTURES FORUM

8-9 December 2021
Houston, TX

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HGS Web Content Manager	Alyssa Cushing	713-463-9476	acushing@hgs.org	



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ON THE COVER: Absaroka Mountains Volcanic Province
on the North Fork of the Shoshone River and the
western side of the Bighorn basin. Photo provided by
Patty Walker.

Africa Energy Futures Forum 8-9 December 2021 in Houston, TX



THEME

Africa's Energy Security, Regional Economic Development In A Disruptive Global Economy.

Four Seasons Hotel, Houston, Texas.

8th - 9th December 2021.

The Africa Pavilion and the Africa Energy Futures Forum present prime platforms for the African Oil and Gas Community to engage with the global investment publics; oil and gas business ecosystem to address the critical challenges affecting the inflow of foreign direct investments across the energy business value chain as well as engage with the global energy players to chart a regional strategy for the emerging energy transition. Both initiatives enable a cost effective, strategic, leveraged and managed service approach to country participation in the Exhibition Program of the 23rd World Petroleum Congress that delivers immense return on investments and objectives.

Click [HERE](#) to read more.



The Zambezi River flows over a basalt plateau which has cracks, which run east-west, filled with weaker sandstone. The falls have been receding upstream over the last 100,000 years eroding the sandstone filled cracks to form the zig zag chasms called the Batoka gorges.

Photo provided by Dr. Marc Helsinger

MIKE ERPENBECK



This month's prez letter comes from northern Idaho, where I am spending a long Thanksgiving visit with family. I have visited this area on a number of occasions even before family members recently transplanted themselves here in the Coeur d'Alene area—mainly due to my fascination with the mega-sedimentary deposits to the west

from a large glacial flood that originated just north of here. Between 15–13,000 years ago the sudden emptying of 500 cu mile, (300 sq mile) proglacial Lake Missoula occurred. Its cause was the instant melting of an ice dam located at the site of the southern end of present-day Lake Pend Oreille, resulting in a 2000 ft wave of water that washed over much of eastern Washington and northern Oregon. The scablands topography downstream provides dramatic evidence of that dramatic event, but it turns out to have been only the latest such flood as it obliterated evidence from previous (45–50) such floods.

The spectacular nature of this event almost takes a back seat to the backstory of how a catastrophic origin came to be accepted by the geologic community over 40 years of debate. Initial proposals came from J. Harlon Bretz in 1922, who shocked the geologic community by claiming the surface features came from a large scale cataclysmic flooding event... incurring the derision of the geologic community. The young science of geology was in the process of establishing its claim of slow constant change over unimaginably long periods of time. This was seen as defiance of centuries-old church authority, which controlled interpretation of physical phenomena using literal translation of Scripture. The anti-catastrophist scientific "consensus" wasn't about to hand control back to religious-based institutions and fought back against Bretz's proposal. (He didn't help his own case by referring to it in scientific journals as a flood of "Biblical proportions"). But eventually he was vindicated, as the scientific community further debated the issue, uncovering more evidence of large scale flooding, and it came even to acknowledge its own former biases. The resolution of the cause of the "Bretz floods" provides an example of how real scientific debate occurs.

The almost absurd use of Phanerozoic (current) Eon to categorize an event merely 15 thousand years ago nevertheless provides the context to circle back to the title of this letter. The northern Idaho area is also the site of deposition of sediments from a completely different Eon. It provided me the opportunity to investigate 1400 million year old rocks from the Proterozoic Eon. The entire surface of the Idaho panhandle is comprised of these sedimentary rocks of the Belt Supergroup. This area was the site of a continental rifting that allowed 10,000 feet of deposition of these fine grained sediments. The source of deposition came from the west of the rift (the current western edge of the northern Idaho boundary), but it has been transported by transform rifting to other areas. Candidates for the source

are the Siberian craton, Australia, and eastern Antarctica. Lively debate is occurring, but the lack of fossil assemblages make correlation difficult.

Despite their vast age, the rocks contain sedimentary structures, (ripples, mudcracks, etc.) that are often well preserved. Partly this is due to the complete lack of burrowing and other disruptions, as such life forms that would be 800 million years in the future. It is always thrilling to touch ancient rocks (as most field geologists sense), especially when they also have same sedimentary structures as today and yet were formed when the atmosphere was so different. Most of it was methane and CO₂, containing only 1–2% Oxygen. Yet those sedimentary structures are nearly identical to those forming today. To me it is comforting to sense the permanence of our planet. It helps put into perspective all the discussion about the irreversible nature of tipping points.

Musings on these two eons suggest the opportunity we geologists have to inspire and educate the larger community about the nature of science and its advancement, (using evidence of the changing earth as the enticement). Historically, scientific debate among accredited colleagues has sought to objectively apply critical analysis, leaving the outcome open to further data collection and evaluation of that newer data. In the traditional Scientific Method, theories are proposed, and not claimed from the outset to be "facts". The true Scientific Method objectively evaluates current and evolving theories, whether or not they are held by consensus. It follows then that open, technical debate guided by the Scientific Method allows theories to be evolved by integrating verifiable data into more accurate and comprehensive understandings of the subject.

As scientists, we have not only the opportunity to explain these concepts to our nonscientific fellow citizens, but to many of us it is an obligation, to evaluate and explain in the most objective and accurate manner possible. To the HGS it is in fact, mission-critical. This is how we Serve the Science.

Please consider joining our outreach efforts. The HGS Educational Outreach committee has redoubled its commitment to reach out to local public and private educational institutions. Committee chairs Steve Johansen and Letha Slagle are seeking new members and new ideas. Help us find you. Contact Steve Johansen at geosjjohansen@gmail.com.

Mike Erpenbeck, President

"The resolution of the cause of the 'Bretz floods' provides an example of how real scientific debate occurs."



COVID-19 Policy Statement

Updated December 1, 2021

The Houston Geological Society continues to maintain a cautious approach to indoor social and educational gatherings. Please check the HGS website on a regular basis for all HGS online event opportunities.

The HGS Board will continue to monitor the situation and governmental directives to determine the pace of opening up the holding of HGS in-person events or whether the situation calls for reversing the trend in some measure.

Please monitor [hgs.org](https://www.hgs.org) and your email for further communication concerning HGS events.

For more information about how you can help to prevent the spread of the virus, visit the CDC website: <https://www.cdc.gov/>.

2021-2022 HGS Board

FROM THE EDITOR

SCOTT SECHRIST



As 2021 draws to a close, HGS Members and Volunteers continue to give Thanks for our passage through a very challenging year, as we prepare to enjoy the Holidays.

The December HGS events will be focused in the first half of December to respect our members and volunteers' plans to travel and

celebrate the Holidays with their families but stay tuned! We will have some MUST SEE events coming your way before you pack those bags! Yet before we leave November, let's have a quick look back at some of the noteworthy HGS events from last month.

The EAGE-HGS Latin American 3-day Conference was a very successful Hybrid event, beginning on Monday November 8 with an in-person networking reception and dinner on November 8th, followed by online virtual presentations on November 9th and 10th attended by 80+ people.

The annual Houston Gem, Mineral and Fossil Show was held Friday, November 12 thru Sunday November 14, at the Civic Center in Humble, Texas. Perennial HGS Volunteer and HMNS Geo-Docent Dr. Janet Combes was so kind as to provide a substantial report with lots of pictures. While customers were admiring the interesting rocks, intriguing fossils, beautiful gemstones, and exotic minerals, nearly a dozen HGS Volunteers (all honored in the article, later in this Bulletin) held forth at tables, provided Geo Posters for multiple Boy Scout groups, answered teachers, families, and kids' questions for a glorious weekend of HGS Geological Outreach. See the article and pictures; it's a really enjoyable story. Our THANKS to Janet and ALL the HGS Volunteers for sharing their time, knowledge, and passion for Geology!

At the Monday, November 15 HGS International Virtual Dinner meeting, Dr. Elisa Fitz Díaz from the National University Autonomous of Mexico (UNAM) near Mexico City, D. F. presented a Mexico and Western Gulf of Mexico oriented look at "The Role of Structural Inheritance in the Tectonic Evolution of East and South Mexico: From Paleozoic Pangea Assembly to Mesozoic Rifting and Cenozoic Shortening and Basin Inversion". Dr. Diaz' fascinating presentation on the foundational Paleozoic to Modern tectonics provided a timely introduction to HGS' December activities.

We begin on Monday evening, from 6 to 7 PM, December 6, 2021, with the HGS Virtual General Meeting: "Paleozoic Orogenesis of North America", as an HGS Zoom Virtual Event. Our presenter will be Kurt Rudolph, Retired ExxonMobil Chief Geoscientist, now Adjunct Professor at University of Houston & Rice University. Kurt's presentation of "Paleozoic Orogenesis of North America"; will focus on the Assembly of Pangea, a view from Laurentia – Paleozoic Orogenies and their Impact on Basin Evolution and Petroleum Systems.

Kurt is a skilled and engaging speaker with multiple awards from AAPG, SEG and RMAG. This will be a memorable presentation that will detail the complex assemblages and fascinating history of Paleozoic Plate Tectonics.

But now, BREAKING NEWS...

The Houston Geological Society will join with the Africa Energy Futures Forum on Wednesday, December 8th and Thursday December 9th at the Four Seasons Hotel in Downtown Houston. The HGS will have a booth on the Pavilion Floor, right beside NNPC; 'in the "heart of the action". The Theme of the Forum is: Africa's Energy Security and Regional Economic Development In A Disruptive Global Economy. "The Africa Pavilion and the Africa Energy Futures Forum present prime platforms for the African Oil and Gas Community to engage with the global investment publics; oil and gas business ecosystem to address the critical challenges affecting the inflow of foreign direct investments across the energy business value chain as well as engage with the global energy players to chart a regional strategy for the emerging energy transition. Both initiatives enable a cost effective, strategic, leveraged and managed service approach to country participation in the Exhibition Program of the 23rd World Petroleum Congress that delivers immense return on investments and objectives". Please see the HGS website for links to the events and registration. The Africa Energy Futures Forum will also be a participant in the 2022 HGS-PESGB Africa Conference, currently scheduled in Houston for mid-September 2022.

The Wednesday, December 8, 2021, HGS Engineering and Environmental Group speaker and topic are TBA, as of this writing. See the Bulletin, the HGS Website and the HGS Calendar for the latest updates.

Following the Holidays and New Year's celebrations, January 2022 will begin with a Joint HGS-GSH January Virtual Evening Meeting, celebrating the Seismic Centennial! Our speaker will be Dr. James Knapp, presenting "Reflection Seismology: Born in Oklahoma, 100 Year Centennial". Dr. James Knapp is an OSU Professor and Boone Pickens Distinguished Chair of Geoscience at the Boone Pickens School of Geology, in the Noble Research Center of Oklahoma State University in Stillwater, OK.

On Monday January 24th, 2022, the HGS North American Virtual Evening Meeting will present four exceptional speakers addressing "The State of Private Equity in Oil & Gas". Register early, as we expect a sellout crowd for this Zoom event! More about January meetings to come, right around New Years. Be Safe and Have Fun!

During the Holiday season, we have much to be thankful for. Take time to enjoy the holidays as much as possible during this pandemic transit. Stay safe and healthy as you travel and gather with Colleagues, Friends and Family.

We continue to Honor and Thank ALL our HGS Members, Volunteers and HGS educational outreach teams!
HGS Editor 2021-2022 | Scott C. Sechrist | Editor@ HGS.org

HGS VIRTUAL GENERAL DINNER MEETING

MONDAY, DECEMBER 6, 2021 | 6:00 - 7:00PM

ZOOM WEBINAR

HGS MEMBERS \$15 NON-MEMBERS \$30 STUDENTS \$10

[HTTPS://WWW.HGS.ORG/CIVICISM/EVENT/INFO?ID=2301](https://www.hgs.org/civicism/event/info?id=2301)

EVENT CONTACT: PATTY WALKER | PATTYWALKER1@ICLOUD.COM

The Assembly of Pangea, a view from Laurentia – Paleozoic Orogenies and their Impact on Basin Evolution and Petroleum Systems

Paleozoic North America has experienced multiple mountain building events, from Ordovician to Permian, on all margins of the continent. These have had a profound effect on the resulting complex basins and their associated petroleum systems. Subsequent uplift, erosion and overprinting of these ancient systems impedes the direct observation of their tectonic history. However, the basin sedimentary records are more complete, and provide additional insights into the timing and style of the mountain building events. In this study, we employ ~80 1D basin models, ~30 inverse flexural models, isopachs, and paleogeographic maps to better understand the history of Laurentia. From this screening, four thematic learnings emerge:

Constraints on the magnitude, timing, and location of collisional events. For example, the Salinic and Acadian Orogenies of the Appalachians are restricted to the north; the southwestern end of the Silurian and Devonian foredeeps are interpreted as indicators of the terminus of the colliding Ganderian and Avalonian microplates. For the Alleghanian event, onset of flexural subsidence becomes younger to the northeast, whereas the Ouachita Orogeny youngs to the southwest. These observations suggest the docking of Gondwana in the Pennsylvanian-Permian was diachronous due to complex plate geometries and/or trajectories.

Kinematic linkages between continent margin and interior. “Sag” basins, whose origins remain cryptic, can be tied to adjacent orogenies. The Michigan Basin has synchronous timing, and a similar evaporite fill as the Salinic portion of the Appalachian foreland. And the Williston Basin appears tied to the north Antler (Liard) foreland with Middle Devonian to Early Mississippian subsidence and deformation (e.g., Nesson Anticline). Eastern Ancestral Rocky Mountain (ARM) basins of the continental interior are coeval with the central segment (Arkoma-Fort Worth basins) of the Ouachita fold belt. But basins near the Val Verde – Marathon segment (Delaware, Midland, Orogrande, and Taos) share a later timing.

Controls on sedimentary fill character. Often, the onset of rapid subsidence associated with orogenesis is marked by a rapid transgression and condensed section that is associated with marine source rocks and shale reservoirs. As sedimentation catches up to the increased accommodation, a thick sedimentary wedge progressively fills in the flexural basin. This pattern is observed for the Utica (Taconic), Marcellus (Acadian), Horn River (Liard), Wolfcamp (Delaware and Midland), and Gothic/Cane Creek/etc. (Paradox) source rocks.

Reconstruction of thick Permian basin fill in exhumed basins. Many of these basins have experienced significant post-Paleozoic erosion by vertical unroofing and/or subsequent deformation. This has made understanding of the latest Paleozoic basin history difficult. High vitrinite reflectance in outcropping or shallow strata indicate significant burial and ensuing removal. In most cases, this additional burial cannot be attributed to significant Mesozoic-Cenozoic sedimentation. Using calibrated basin models, significant upper Pennsylvanian and Permian section has been restored in a number of these basins. Estimates of the eroded latest Paleozoic section include the Appalachian (3.5 km), Black Warrior (3 km), Arkoma (3.0 km), and Fort Worth (2.5 km) basins. This burial was critical in the maturation of important source rocks/shale reservoirs in these basins.

Biographical Sketch

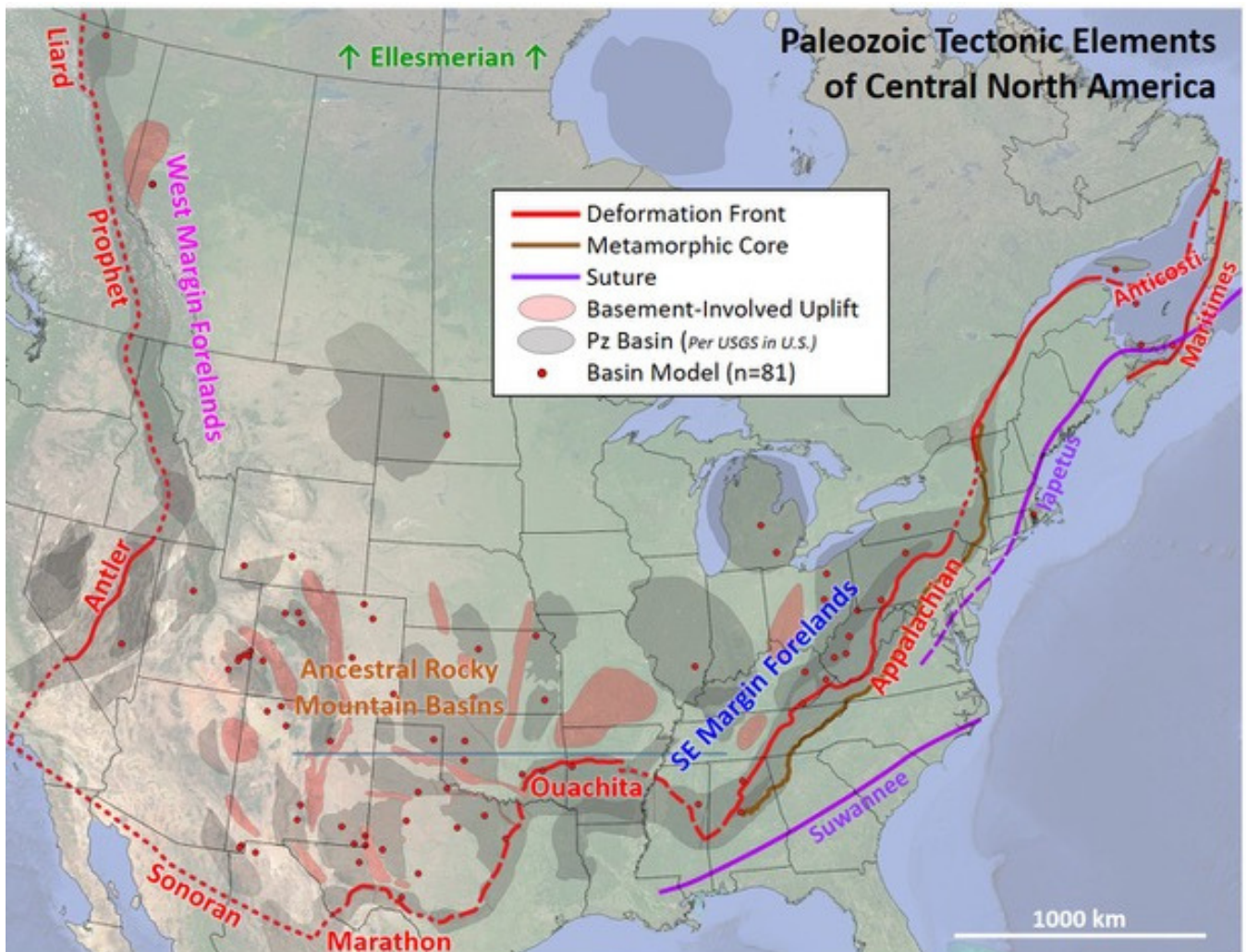


Kurt Rudolph received a B.S. in Geology from Rensselaer Polytechnic Institute and an M.A. in Geology from the University of Texas. He began his career as an Exploration Geologist with Unocal in 1978, until he joined Exxon Production Research in 1981. He held a variety of

positions at Exxon/ExxonMobil, including Research Geologist, Chief Interpreter in Kuala Lumpur, Technical Advisor for the Africa and Middle East Region, and Hydrocarbon Systems Resource Manager. From 2002 until his retirement in 2015, he was Chief Geoscientist with ExxonMobil Exploration Company in Houston. Since then, Kurt has been an Adjunct Professor at the University of Houston and Rice University.

His interests include seismic attributes/DHI analysis, risking and assessment, sequence stratigraphy, and tectonics and sedimentation. Current research includes the Cretaceous Western Interior, Paleozoic orogenic systems of North America and northern Europe, and integrating subsurface uncertainty into assessment and economic analysis.

He won Wallace Pratt Awards for the best AAPG Bulletin paper in 1994 and 2017, was an AAPG-SEG Distinguished Lecturer for 2001-2002, was the AAPG Michael Halbouty Lecturer for 2007, and won best paper award for the Mountain Geologist (RMAG) in 2015.



HGS Golf Tournament

Monday, October 18, 2021

Format: 4-Man Scramble



LETTER FROM JIMMY BAGLEY, GOLF TOURNAMENT COMMITTEE CO-CHAIR

The HGS Golf tournament this year was a fun time all around not to mention a very successful event for HGS. It gave us all a chance to re-connect with some whom we haven't seen in person for more than a year, and others a great way to strengthen relationships. Elliot Wall of Core Laboratories the tournament Chairman for this year's event has done a tremendous job of planning and executing this event for years now. While this year's event could be considered smaller in scale than years past, the simple fact that it happened is a victory in itself. Planning during the pandemic must've been extremely challenging, especially after missing 2020 altogether.

Kenny Baucum of Stratagraph and I have been passed the "Golf Club" and will be the new Chairman and Co-Chairman for the HGS Golf Tournament moving forward. We have large shoes to fill for sure, and we both hope to live up to the expectations curated from the time Elliot has dedicated. I am looking forward to 2022 excitedly and encourage you to set up and volunteer with HGS. I know we can continue to count on the supporters from prior years, and hope to bring new ideas, companies, and teams into the fold as well.

Sincerely,

Jimmy Bagley, Continental Laboratories
HGS Golf Tournament Co-Chair



Elliot Wall, outgoing Golf Tournament Chairman. We thank Elliot for his hard work and dedication to HGS and to the Golf Tournament Committee.



HGS Golf Tournament 2021...continued



Geovision/DataLog Sponsor booth.



Golf hole sponsored by Infinity Hydrocarbons.



Diversified Well Logging (DWL) Golfers.



Golf hole sponsored by Continental Laboratoies.



"Well I guess they are not going to use my shot." - Barry Perilloux

December 2021

<i>Sunday</i>	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>
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Cheated, Mistreated, Pushed Around?

Have you been cheated, mistreated or somehow deprived of your share of a deal, working interest or royalty? If so, give me a call. I have thirty years experience as a working interest and royalty owner in the oil and gas business to go along with forty years of court room experience. A trusted team of professionals together with the necessary resources is available to work on your case. You do not pay anything unless we win.

Proven Results




- \$6,000,000 Future payout projected for settlement to widow with ORRI recovered under husband's consulting contract after company contended no payments due after death.
- \$5,800,000 Combined cash settlement for UPRC East Texas and Central Louisiana royalty owner class action cases for underpaid royalties. Court approved fee of 1/3.
- \$4,700,000 Jury verdict, oil company violates geologist non-compete contract. Settled later on confidential terms.
- \$2,000,000 Settlement for downhole failure of casing results in loss of well bore, net to client \$1,372,411.79.
- \$1,175,000 Settlement for geologist and family where oil company drilled too close to geologist property. Case filed 18 years after well drilled. Net to client \$664,822.51.
- \$986,000 Cash settlement, net to clients \$657,207.60, plus future mineral interest valued at \$500,000.00. Dispute over mineral interest ownership from thirty year old contract.

Robert A. Chaffin

THE CHAFFIN LAW FIRM

4265 San Felipe #1020 • Houston, Texas 77027 • (713) 528-1000 • Cell (713) 817-2786 • robert@chaffinlawfirm.com

December 2021

<i>Thursday</i>	<i>Friday</i>	<i>Saturday</i>	
2	3	4 	<p>Reservations</p> <p>The HGS prefers that you make your reservations online through the HGS website at www.hgs.org. If you have no internet access, you can email office@hgs.org or call the office at 713-463-9476.</p> <p>Reservations for HGS meetings must be made or cancelled by the date shown on the HGS website calendar, which is normally 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, please contact the Webmaster at webmaster@hg.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 still be billed.</p> <p>Pricing</p> <p>In-Person Meetings HGS Members \$35 Non-Members/Walk-Ups \$40 Emeritus/Honorary Life \$15 Students \$5</p> <p>Virtual Meetings HGS Members \$15 Non-Members \$30 Students \$10</p>
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The State of Private Equity in Oil & Gas

HOUSTON GEOLOGICAL SOCIETY



TIME 5-9PM • JANUARY 24TH 2022 • \$35.00



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www.hgs.org

Information
Mark Hamzat O. Erogbogbo
Chairman North American
Explorationists
mark@prosperoog.com
T+1646-389-9019

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Information
Mark Hamzat O. Erogbogbo
Chairman North American
Explorationists
mark@prosperoog.com
T+1646-389-9019

JOSH SHERMAN
PARTNER
OPPORTUNE

jsherman@opportune.com
T+713-490-5050



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Information
Mark Hamzat O. Erogbogbo
Chairman North American
Explorationists
mark@prosperoog.com
T+1646-389-9019

JUSTIN STOLTE
PARTNER | GLOBAL CHAIR
ENERGY & INFRASTRUCTURE
LATHAM & WATKINS

justin.stolte@lw.com
T+1.713.546.7966



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Information
Mark Hamzat O. Erogbogbo
Chairman North American
Explorationists
mark@prosperoog.com
T+1646-389-9019

RICHARD BALL
DIRECTOR - CERTIFIED
PETROLEUM GEOLOGIST
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HGS at the 2021 Houston Gem & Mineral Show

BY JANET COMBES, MUSEUM OF NATURAL SCIENCE CO-CHAIR

On November 12-14, 2021, the annual Houston Gem and Mineral Show was held again this year – after it was cancelled last year for the first time in over 60 years due to COVID – and the Houston Geological Society once again hosted an outreach booth. Although the local school districts did not permit field trips that typically bring several thousand kids on Friday, 97 private school students and 660 home schooled children did come on Friday with specified stops at the HGS booth. On Saturday there were 83 scouts working on geology badges with the HGS booth as a designated part of the process. Total attendance at the HGMS 2021 show was: 3329 paid + 385 teachers/parents + 757 kids = 4471. Paid attendance per day was 739 on Friday, 1638 on Saturday, and 952 on Sunday.

This year to limit contact during the pandemic – no 3D maps with no shared 3D glasses and no shared hand lenses– but geology posters and rocks to look at and samples to take home and geologists to talk with were there at the HGS booth. To further limit contact, a plastic cover was laid over the specimens, so only the barite and rock salt samples were exposed. Hopefully, next year we will be able to let people see and touch the specimens and use hand lenses.

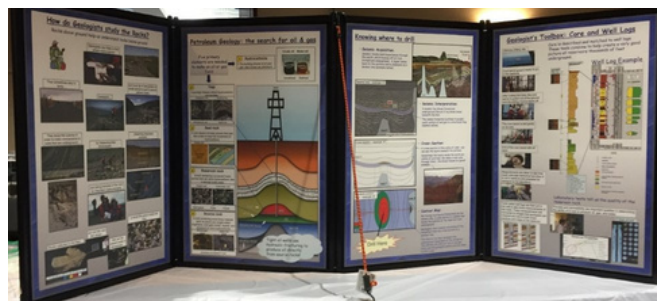


Rock display layout.

HGS booth volunteers at the HGMS show included: Alan Foley, Greg Zelewski, Steve Johansen, Nancy Engelhardt-Moore, Huw James, Michelle Pittenger, Ken Williams, Sarah Heinlein, Paul Riegler, Janet Combes, and Ken Green. Other volunteers wanted to participate but couldn't due to travel or COVID restrictions.

It was quiet until the late morning on Friday. However, about noon, people started moving through the area. The volunteers talked to them either by the posters, handout specimens or the displayed rocks. One bag of Rock Salt or Barite Rose per family or group was distributed in order to make sure the samples lasted through the weekend. All afternoon, there was a small, but steady stream of parents and kids. As one of the volunteers said "We enjoyed our interactions and everyone was interested in the Rock Salt specimens. A few kids really wanted to taste the Salt. So, we had to come up with ideas to discourage the boys from licking them. We did! I enjoyed speaking with the parents about energy and the kids about salt". The new Career Poster also attracted lots of interest from the parents – it was a big hit (see poster [HERE](#)). At least 2-docents were needed, since there usually were multiple families interested in our items.

A large number of Scout groups came through on Saturday. The HGS display posters addressed the questions that the Scouts needed to answer. The volunteers only needed to direct them toward the appropriate posters and let them go at it. Then they followed up with some Q&A time.



HGS posters on what geologists do.

HGS at the 2021 HGMS Show...continued

BY JANET COMBES, MUSEUM OF NATURAL SCIENCE CO-CHAIR

A popular HGS activity at the HGMS show is the distribution of rock samples. John and Dawn Jordan had donated some pieces of barite rose that were given away and were very popular. The Hockley Salt Mine gives the HGS several hundred pounds of rock salt every year or two on request. HGS volunteers then break the large pieces into fist sized pieces and put them in baggies (to resist Houston humidity) – and include labels. There was a “salt party” on October 17 this year to break up and sort and bag the donated salt to use as give-aways at the HGMS show and other outreach events. Seven HGS volunteers and two others – Jim Tucker, Nancy Engelhardt-Moore, Xiuju Liu, Marsha Bourque, Steve Johansen, Dianna Phu, Trinity Phu, Paul Riegler, and Janet Combes – spent several hours banging on the salt rock and putting pieces into baggies and making the labels – and separating out some of the pieces with salt crystals for give-aways to teachers. These samples will also be used for other outreach events through the year.

Visitors and HGS volunteers at the HGS display.



HGS at the 2021 HGMS Show...continued

BY JANET COMBES, MUSEUM OF NATURAL SCIENCE CO-CHAIR

At the HGMS show visitors given salt specimen baggies were encouraged to note the color and translucency of the salt, the shape of the crystals, the strength/weakness of the salt, to stroke on the crystal faces & edges, to note the ability to scratch the crystal faces with fingernails and then to guess the rock substance. This proved to be empowering and raised many smiles on the children's faces.

The Houston Museum of Natural Science volunteers had volunteers with various take-home activities at the tables adjacent to the HGS display tables. The groups interacted frequently.



Sample salt baggie.



Salt piece with a crystal.



Bag of salt from Hockley.



Houston Museum of Natural Science table.

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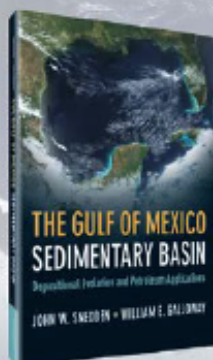
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Text should be submitted by email as an attached text or Word file or on a clearly labeled CD in Word format with a hard copy printout to the Editor.

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

Photographs may be digital or hard copy. Hard copies must be printed on glossy paper with the author's name, photo or figure number and caption on the back. Digital files must be submitted in .tif, .jpg, or .eps format with 300-DPI or greater resolution at the printing size and can 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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10	\$950	\$1,350	\$2,550	\$4,750	\$8,000	\$7,500	\$7,050	\$6,850	\$6,650	\$3,000
9	\$800	\$1,300	\$2,500	\$4,700						
8	\$750	\$1,250	\$2,250	\$4,300						
7	\$600	\$1,100	\$2,200	\$3,850						
6	\$550	\$950	\$1,800	\$3,500						\$2,000
5	\$500	\$800	\$1,600	\$3,000	\$4,700	\$4,500	\$4,350	\$4,000		
4	\$450	\$650	\$1,300	\$2,500						
3	\$300	\$550	\$950	\$2,000						\$1,000
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1	\$150	\$250	\$450	\$1,000	\$1,500	\$1,400	\$1,250	\$1,000	\$1,250	\$850
Professional Directory Section Business Card Ad: 10 Issues – \$160 (\$30 for each additional name on same card)										

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

Placement	Rate	Specifications/Description
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Bundle & Save!	<ul style="list-style-type: none"> • 30% off website ads when combined with print ads in all 10 HGS <i>Bulletin</i> issues. • 20% off website ads when combined with print ads in 5 HGS <i>Bulletin</i> issues. • 10% off website ads when combined with print ads in 3 <i>Bulletin</i> issues. 	



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Qualifications for Active Membership

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

Qualifications for Associate Membership (including students)

- Be involved in the application of the earth or allied sciences.
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Apply online at www.hgs.org and click "Join HGS". Annual dues expire each June 30.

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To the Executive Board: I hereby apply for membership in the Houston Geological Society and pledge to abide by its Constitution and Bylaws.

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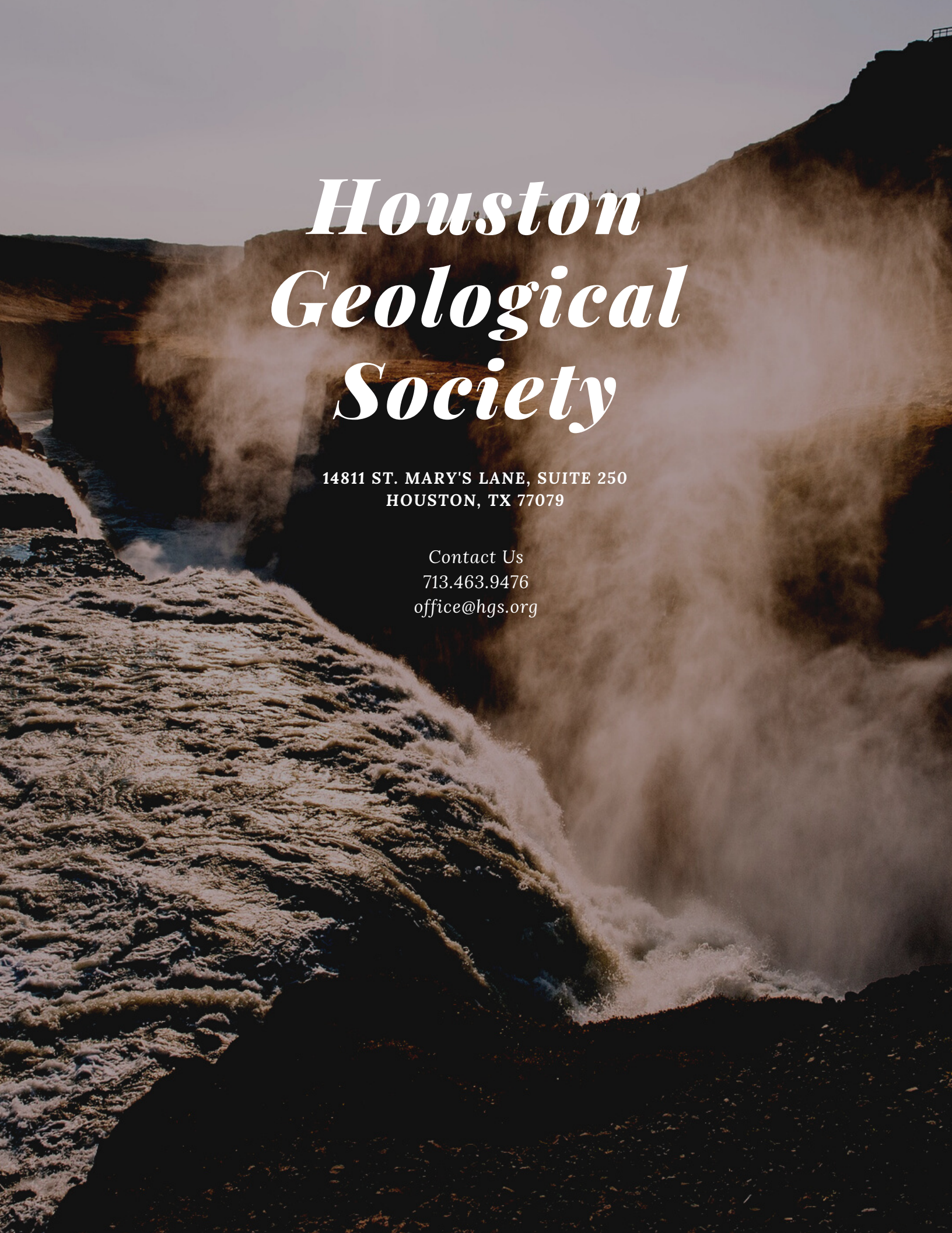
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