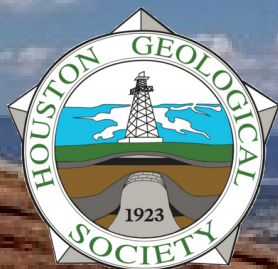


BULLETIN

HOUSTON GEOLOGICAL SOCIETY



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The Impact of the Wichita Uplift
on the Anadarko Basin: How
Understanding Structural
Complexity Helps Mitigate
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Two Decades and Five Paradigm
Shifts Gleaned from AAPG's Giant
Fields Database

NORTH AMERICAN DINNER

The Story of the Kavango Basin,
An Unusual Play Emerging in
Namibia

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



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*Guided Boats,
Cash Pots,
Trophies*



*October 8, 2021
Harborwalk,
Hitchcock, Texas*



FROM THE PRESIDENT

MIKE ERPENBECK



Having made a “vision” kind of theme in my first Bulletin Letter - Serve the science - it seems appropriate to expand the concept a bit in this month’s letter. Perhaps further discussion on the twin elements of science and career as dual concerns of our Society is in order.

A professional geological society located in the traditional energy capital of the world will understandably take on the culture of the industry that employs the bulk of its member scientists. Does this make us “petroleum geologists”? Is the science we are learning and practicing really “petroleum geology”? From the context provided by textbook-publishers and curriculum-designers in our educational institutions, this would appear to be the case. Rather, I think it is more relevant for us in oil and gas to consider ourselves geologists who happen to get paid by petroleum-producing firms to find high energy-content fluids for them in the crust of our earth. In the process, we get to exercise our fascination for regional and global stratigraphy and depositional environments using our knowledge of the processes of sedimentology, tectonic forces, and paleoecological relationships, as the tools of our trade. Are we practitioners of a science separate from geology? A new science that somehow came into existence by the industry that employs us? Surely not.

Still we do recognize the special relationship that exists between our science and our industry. Our industry compensates us to ply our trade to its economic benefit. In the process, we get to play with their vast data that we can use for free, data that our industry generated, as it has spent \$trillions in drilling millions of holes in our earth and in developing technologies enabling us to peer deep in our earth’s crust. It speaks of a profound and useful symbiotic relationship between the science of geology and the oil and gas industry. Is there any other industry that has brought as much to its base science in any other science/industry combination?

It should also be added that by defining our Society as focusing on geology in the broad sense, we also recognize our members whose professional work includes mining, environmental, hydrology, or other geological disciplines. The point is that we are geologists and the better we are at being geologists, the more value we bring to the table with our employers. At the root it’s about the science at least as much as the industry.

I recall reading a white paper a few years ago published by a society whose members consisted of professional associations, an association of professional associations, as it were. Its research discovered a trend of dwindling membership in almost all professional and industry associations. Its conclusion suggested a cultural change in

the way professional employees valued their chosen professions. What was remarkable was the exception to the trend- those associations in the computer, software, and web-building industries, whose membership numbers were dramatically increasing. It not surprising to see how the Silicon Valley crowd could view themselves in a Masters of the Universe sort of way, given the technological revolution they were in the middle of. They were proud of and excited by their professions and the opportunities provided by their industry.

I believe we should view our future as scientists in the oil and gas industry in a similar way. While we are being disparaged at the present by public sentiment, fueled by exaggerations of the green energy lobby and outright falsehoods by climate alarmists, nearly everyone agrees that fossil fuels will remain the major component in the energy mix for many decades to come. We might end up being the Knights in Shining Armor as the public experiences the inevitable energy shortages resulting from current policy decisions.

I also think we have reason to be optimistic about our future by the recent success of the Student Expo held on Sept 13-14. This was the first year that the annual event was hosted by HGS. There were 181 registered students, 116 of which attended in person, despite inclement weather. We express our thanks to Sushanta Bose, Chair of the Event and also Amanda Johnston and Cecilia Ramirez. Martha Lou Broussard organized the invitations and contacts with the students. We could consider this a super-committee but actually it’s structured as event within our Employment Committee, with board member Casey Langdon as Chair. I had intended to recognize in this letter each and every volunteer who worked to make this event such a success, before discovering that there were 20 committee members or on-site volunteers, 23 judges, and 7 speakers. We plan to lay this all out in a November Bulletin article. In the meantime we give a “Well Done!” to the group.

I pledge to provide fewer musings and more internal Society content in next month’s Letter.

Serve the Science

Mike Erpenbeck, President

"We might end up being the Knights in Shining Armor as the public experiences the inevitable energy shortages resulting from current policy decisions."



COVID-19 Policy Statement

Updated October 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



The HGS kicks off October on Sunday October 3rd with the **SOLD OUT HGS Sunday Funday at the Ball Park**; watch for a follow-on repeat soon!

That same weekend sees the kickoff of the **AAPG Mid-Continent Section Meeting** October 3-5, 2021 at the Hyatt Regency Downtown, Tulsa,

OK. The Section's Theme this year is: "The Energy Evolution: Learning from the Past, Powering the Future".

On October 10th, HGS joins the **Annual Houston Earth Science Week** at the George R. Brown Convention Center, thru Saturday October 16th. This year the focus is: "Water Today and for the Future". Decades ago there was an apocryphal prediction for Texans: 'Water will be the next Oil'... it has taken a while, but that prediction is coming to pass. Geologists and all the associated specialties of Hydrology, Soil Science, Fire and Disaster Management will all grow in importance in the years ahead. Our children and Grandchildren will shoulder this increasing responsibility; so Volunteer to Judge, or drop by downtown to see what Houston's children have thought up. Future HGS Members begin here!!

HGS Hybrid General Dinner - **The Impact of the Wichita Uplift on the Anadarko Basin** by Dr. Molly Turko of Applied Stratigraphix. The In Person location for this Hybrid Dinner Meeting will be at the Norris Center; simulcast as a Virtual Zoom meeting, as well. Dr. Turko will discuss the complex geological evolution from Plate Tectonics to the Basin development processes that lead to the opportunities still present for today's geoscientists.

JobSeekers alert! Your HGS is a participating Society in the SPE-GCS **Members in Transition Job Fair** occurring both online and in person as a Hybrid event on Tuesday 12 October at the Harris County Steve Radack Community Center at 18650 Clay Road, Houston, TX 77094.



The Triassic Chugwater in the Bighorn basin. This is at the lake in the recreation area. This formation works as a major topseal separating the Paleozoic HCS (dominantly the Phosphoria) from the Mesozoic HCS (the Mowry and Thermopalis shales). Photo provided by Patricia Walker.

Registration is mandatory and resume/CV must be submitted at least 48 hours before the event. Nearing the event, job-seekers will receive the email invitation and link to register at the Texas Workforce Commission website in order to access the Hiring Event starting on October the 8th. See the website link at:

<https://www.hgs.org/civicrm/event/info?id=2332>

On Wednesday, October 13, 2021 the **HGS Engineering and Environmental Group** will have a Surprise Speaker at the In-Person Event at Craft Republic Houston, 11470 Westheimer Rd. with Social 5:30 p.m., Dinner 6:30 p.m., Presentation 7:30- 9:00 p.m.

STGS Field Trip - **Geology, Frontier History and Oenology of the Texas Hill Country**

On Friday 15 October. our friends in San Antonio at the South Texas geological Society (STGS) have a few seats left for their geological and wine tasting tour of the Texas Hill country. The Field Trip leader will be world renowned geologist Pete Rose, describing the origin, technical and economic aspects of Carbonate reservoirs, visiting multiple outcrops and making tasting stops at three Wineries with Carbonate Soil 'Terroir'; Sister Creek, Becker and Perissos. The coach departs the San Antonio Petroleum Club parking lot at 8:00 AM and returns Saturday evening at 6 PM.

There are TWO big HGS events on Monday October 18th: **The Annual HGS Golf Tournament** tees off at at Sterling Country Club and Houston National Golf Club. NOTE the Entry Deadline: October 14th! Register!

The second event is the **HGS International Group's Virtual Dinner Event via Zoom**, featuring John Dolson's presentation of "AAPG's Giant Fields Database: five major paradigm shifts over twenty years." John presents a fascinating study of how persistent reevaluation of long-held and beliefs about finding Giant Fields gave rise to new concepts; some quite unexpected. Two examples: Giant Productive Fields atop Oceanic Crusts and Permanently Tilted Hydrocarbon Fluid Contacts. Register to learn about more of the New Paradigms revealed by studying the Giant Fields in the last few decades.



Flatirons of the Mowry Shale in the Bighorn basin. ExxonMobil and GSA run field trips in the Bighorn basin. This is a typical class photo picture spot. Photo provided by Patricia Walker.

FROM THE EDITOR...continued

SCOTT SECHRIST



On Wednesday, 20 October, the IAGC 50th Anniversary Annual Conference will be held at The Westin Houston, Memorial City Hotel, either virtually or in-person. In addition to celebrating IAGC's 50 Years of Energy Transformation, as the only global trade association representing the G&E industry, All are welcome to attend a special In-

Person reception celebrating "100 Years of Seismic". HGS Members have a 50% Discount code offered!

In the following week, on Monday 25 October, the HGS North American Virtual Dinner Zoom will host Dr. James W. Granath speaking about "**The Story of the Kavango Basin, An Unusual Play Emerging in Namibia**". Jim is a renowned expert in Structural Geology, having worked in more than 40 countries worldwide. He brings a fresh perspective to new plays and concepts. Be sure to ask him about his Grad student Field Trips, including a summer earning his next semester's tuition and fees by Gold Mining in the Wilds of NorthWest India; fascinating, true adventures!

Ending the month is the **Hybrid In-Person AND Virtual GeoGulf Convention** from Wednesday 27 thru Friday 29 October in Austin, Texas. The Convention theme is "Sustaining Geoscience through the Energy Transition".

There will be a wide array of Gulf Coast / Gulf Of Mexico oriented oral presentations, special sessions, panel discussions, focused short courses, nonstop networking and great field trips! A Virtual EagleFord Journey, the Llano Uplift, Water and Caverns; this one has it all... going into Halloween weekend! Your greatest challenge will be to determine which ones you just can't miss...

There is a major HGS first-of-the-month event on Monday November 1st 2021: jointly hosting the HGS **Annual University of Houston Sheriff Lecture** as a Virtual event on Zoom from 6 – 9 PM. There will be Virtual Student posters (Judges Needed!); U of H State of the Department presentations, Outstanding Alumni Award, UH Student Poster Awards, and the Keynote presentation.

Dr Sean Gulick, Research Professor at the Jackson School of Geosciences at the University of Texas at Austin will present **Life and Death by Impact: Drilling for Clues** based on his research of the geological processes, environmental effects, and habitability of the Cretaceous-Paleogene Chicxulub meteor impact. Dr. Gulick took many World Class field trips to back up his research, highlighted in his service as the co-chief scientist for IODP Expedition 364 to the Chicxulub Impact Crater during 2016-18.

Wishing All great success and the best of health!
HGS Editor 2021-2022
Scott C. Sechrist



The rugged Wichita Mountains form the southern boundary of the Anadarko Basin in Southwestern Oklahoma. Photo provided by Dr. Molly Turko.



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@SPE-GCS HIRING EVENT

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#SPEGCSHiringEVENT

SPE Gulf Coast Section
Hiring Event



SAVE THE DATE!

SPE-GCS FALL 2021

Hiring Event

OCTOBER 11-12, 2021
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Virtual Industry Panel Event

Members in Transition



RELIABLE ENERGY IN AN ENERGY TRANSITION
PANEL EVENT: OCT 11, 9 TO 11 AM (CST)



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Engineer
Illinois State Geological
Survey



NATHAN MEEHAN, PHD
2016 SPE President
President CMG Petroleum
Consulting
(Moderator)

Register NOW at <https://www.spegcs.org/events/6154/>

HGS HYBRID GENERAL DINNER MEETING

MONDAY, OCTOBER 11, 2021 | 5:30 - 9:00PM

NORRIS CONFERENCE CENTER | 816 TOWN & COUNTRY BLVD. #210

IN PERSON: HGS MEMBERS \$40 NON-MEMBERS & WALK-UPS \$45 STUDENTS \$15

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

[HTTPS://WWW.HGS.ORG/CIVICRM/EVENT/INFO?ID=2300](https://www.hgs.org/civicism/event/info?id=2300)

EVENT CONTACT: PATTY WALKER | PATTYWALKER1@ICLOUD.COM

The Impact of the Wichita Uplift on the Anadarko Basin How Understanding Structural Complexity Helps Mitigate Operational Risk

In order to mitigate the risk associated with structural complexity in a basin, it is vital to understand the mechanical stratigraphy alongside the origin and kinematics of structures (and reactivated structures). In this talk we will look at the evolution of the basin, discuss the driving mechanism for strike-slip deformation, and review associated fault kinematics that can aid in predicting sub-seismic structures.

The Anadarko Basin originated in the Precambrian during the breakup of Rodinia when one arm of a failed rift tore through southern Oklahoma as a large igneous province was emplaced. During the Pennsylvanian Orogeny, intra-plate tectonics inverted the failed rift creating the Wichita Uplift and associated Anadarko foreland basin as seen today.

Deformation styles between the southern and northern parts of the Anadarko Basin differ, yet both record the tectonic evolution of the basin. In the southern Anadarko Basin, deformation is dominated by thin-skin fold-thrust structures along detachments that can be linked back to thick-skin deformation along the Wichita Uplift. Several of these structures were cut by late-stage strike-slip faults recording a rotation in the regional stress field from NE-directed in the Early to Mid-Pennsylvanian to ENE-directed during the Late Pennsylvanian.

The central and northern regions of the Anadarko Basin tend to be dominated by high-angle strike-slip faults with limited horizontal and vertical offset. The timing of these faults is synchronous with the Wichita Uplift and form at an optimal orientation for strike-slip deformation under a NE-directed stress field. Additional structures in the basin include fracture corridors and reactivated basement faults. While these structures tend to be more subtle in seismic data, including the strike-slip faults, they still have the ability to wreak havoc on operations in the basin. Operators commonly deal with mud losses, well connectivity, and reservoir compartmentalization in areas that appear to be structurally quiet. By understanding the origin and kinematics of these structures, operators can mitigate and prepare for the associated risks.

Biographical Sketch



Dr. Molly Turko has over 13 years of experience in the oil and gas industry and is a subject matter expert in structural geology. She has had the opportunity to work in multiple basins in the U.S including the Anadarko, Ardmore, Delaware, Powder River, Appalachian,

Onshore Gulf Coast, and Rocky Mountain Basins.

She received both a B.Sc. (2009) and a M.Sc. (2011) in geology from the University of Tulsa followed by a Ph.D. (2019) from the University of Oklahoma where she studied under Dr. Shankar Mitra.

Her work experience includes Chesapeake Energy, Devon, and several small operators in Tulsa. She has taught courses for R.M.A.G., AAPG, Applied Stratigraphix, and for the Ore Geology Conference. She is also the Vice President of AAPG's Petroleum Structure and Geomechanics Division for 2021-2023.

Molly's passion is mentoring and teaching, but her favorite role is leading structural geology field courses in Nevada and Southern Oklahoma.

She is currently a team member of Applied Stratigraphix as their Structural Geology Expert along with consulting for Turko Tectonics and Structural Geology.



HOUSTON GEOLOGICAL SOCIETY

ANNUAL GOLF TOURNAMENT

October 18, 2021

Sterling Country Club, Houston, TX

Format: 4-Man Scramble

Entry Deadline: October 14, 2021

For sponsorships, please call the HGS Office
at 713-463-9476 or email office@hgs.org

VISIT WWW.HGS.ORG TO REGISTER

HGS Golf Tournament

Monday, October 18, 2021

Format: 4-Man Scramble



Come join us for golf, food, friends, and fun at the annual HGS Golf Tournament at **Sterling Country Club and Houston National Golf Club** (www.sccathn.com). There will be prizes awarded for closest to the pin and long drive, putting games before we start, as well as many great door prizes for participants.

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

Early Bird Special (Through October 8th): \$150.00/golfer or \$600.00/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.

SCHEDULE OF EVENTS

8:00 – 9:45 a.m. Registration, free use of driving range and mini games.

(Breakfast will be provided by Core Lab and 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

Companies or individuals interested in sponsoring the event should contact Andrea Peoples or Alyssa Cushing at office@hgs.org or 713-463-9476. Sponsorship deadline is October 8th.

REGISTRATION OPTIONS

-Online: <https://www.hgs.org/civicrm/event/info?id=2298>

-Email: office@hgs.org

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

If paying by check, please make check payable to HGS or Houston Geological Society.

Team Captain: _____ Phone: _____ Amount Enclosed: \$ _____

Company _____ Email _____

Credit card # _____

Billing Address: _____

Expiration Date _____ Security Code _____

Foursome Members
(Please Print)

Company

Phone

Email

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2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____

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

HGS VIRTUAL INTERNATIONAL DINNER MEETING

MONDAY, OCTOBER 18, 2021

6:00 - 7:00PM

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

[HTTPS://WWW.HGS.ORG/CIVICISM/EVENT/INFO?ID=2311](https://www.hgs.org/civicism/event/info?id=2311)

EVENT CONTACT: STEVE GETZ | SLGETZ@OUTLOOK.COM

Two Decades (2000-2020) and Five Paradigm Shifts Gleaned from AAPG's Giant Fields Database

There have been 248 giant fields (> 500 MMBOE) found since 2000. Information gleaned from studying these giant fields data has shown that the industry has undergone at least five major paradigm shifts in the last 20 years.

First, unconventional and tight gas exploration has transformed the industry. It is expanding to South America, Oman, Bahrain, China and other countries.

Secondly, creaming curves show step changes in success in finding giant combination and stratigraphic traps. These traps now comprise 60% of the volumes, up from 10-15% historically, and attributed to improved seismic imaging. The most important trends are salt-sealed carbonate reef complexes in the Caspian Basin, Egypt, Brazil and Turkmenistan. Of equal importance are passive margin turbidites, often de-risked with AVO and 3D seismic reservoir imaging.

Third, ultra-deep drilling to 5-9 kilometers below mudline is finding oil, rich liquids and porosity. Some of this can be explained by lowered geothermal gradients beneath thick salt, but other oils occur at temperatures of 160-180 C with very high pressures. We discuss new concepts to explain these deep liquids from the standpoint of PVT data and fractionization during migration.

Fourth, giant fields have been found overlying oceanic crust, breaking a long-held paradigm that these kinds of plays don't work. Lastly, deep, over-pressured upward hydrodynamic flow and tilted hydrocarbon contacts has been documented in many basins. This may ultimately turn out to be more of a 'norm' than an exception.

Authors

John C. Dolson1

Zhiyong He2

Brian W. Horn3 1 DSP Geosciences and Associates, LLC, Miami, Florida, USA

johndolson@dspgeosciences.com 2 Zetaware, Houston, Texas, USA

zhe@zetaware.com 3 ION E&P Advisors, Houston, Texas, USA

Biographical Sketch



John C. Dolson is the Director of DSP Geosciences and Associates in Miami, Florida. He received a B.A. in Natural Sciences from Colorado College in 1971 and an M.Sc. in Earth Sciences from Colorado State University in 1981. John has over 40 years of global experience in

both conventional and unconventional plays. This includes exploring and living in Egypt for 8 ½ years with Amoco/BP, 1 ½ years in London with a BP basin review team and a Senior Advisor in Moscow, for 4 years with TNK-BP.

After 28 years with Amoco and BP, he formed DSP Geosciences and Associates in 2008 and has worked globally with over 30 companies, primarily in basin and play analysis and high-resolution sequence stratigraphy (with his late partner, George Pemberton). He joined Delonex Energy in 2013 as Senior Geological Advisor, focusing on onshore exploration in Africa. His 'side effort' is serving as an Adjunct Professor at the University of Miami, teaching petroleum geology.

John has published extensively, with over 90 presentations and papers, and 3 books on a wide variety of topics. In 2016 he decided to bring his life-long learnings into a book, *Understanding Oil and Gas Shows and Seals in the Search for Hydrocarbons* (Springer-Verlag). He has two public service awards and an AAPG Distinguished Service award and a past Vice President (2006-2007)

He became interested in giant fields in the late 1980's, adopting the belief that you 'can't have too many analogs in your kit'. For the last 5 years he has been updating AAPG's Giant Fields GIS database, adding over 1000 references, hundreds of new fields and many revisions to some of the prior field data. The learning continues 40 years later and continues to provide creative insight into evolving exploration techniques.

Through all this work, he credits his wife and travel companion for her patience, support, ability to keep things in perspective, while basking in the tropical paradise of home in Coconut Grove, Florida.



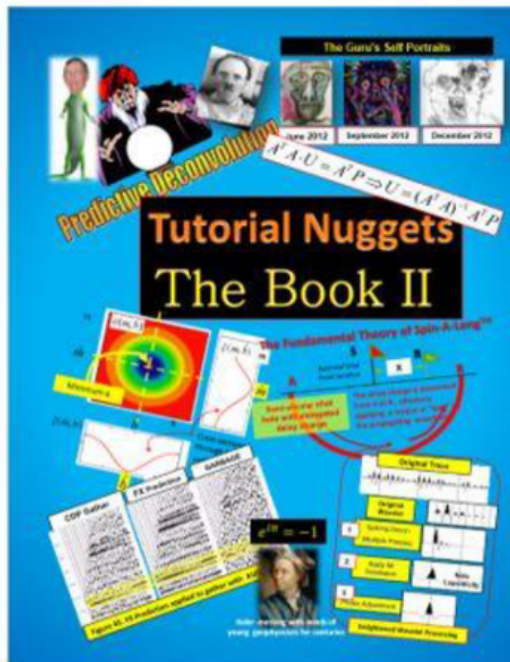
2021 GSH FALL FORUM

Carbon Capture, Utilization & Storage (CCUS) The Path to a Zero Carbon Future November 18, 2021

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HGS VIRTUAL CONTINUING EDUCATION SHORT COURSE

TUESDAY, OCTOBER 19, 2021

8:00AM - 12:00PM

HGS MEMBERS \$30 NON-MEMBERS \$45 STUDENTS \$20

[HTTPS://WWW.HGS.ORG/CIVICRM/EVENT/INFO?ID=2338](https://www.hgs.org/civicism/event/info?id=2338)

EVENT CONTACT: THOM TUCKER | CENTURY@FLASH.NET

Encore Presentation: How to Use Paleontology in the Oil and Gas Industry

Course Description

This 4-hour course will give a brief introduction on how paleontologists use fossils and biostratigraphy to help correlate borehole information. The primary focus of this course is to provide practical and pragmatic techniques for the non-specialist to help integrate paleontological information with other borehole data, as well as recognize when to seek specialists' advice. While this course is geared for the geoscientist, engineers (reservoir/drilling/completions) will also find utility.

Summary

This course will introduce micropaleontology, biostratigraphy, biofacies analysis, and chronostratigraphy to those who need to work with biostratigraphic data in subsurface correlations. This course is designed for the industry professional to gain a full appreciation of how these topics contribute to, and are integrated in petroleum exploration and development. The basic concepts will be developed together with the essential vocabulary necessary to understand and communicate with specialists in those fields. Practical application of this knowledge will be developed through the use of examples, case histories, and hands-on exercises. The goal is to develop the geoscientist's capability to competently and confidently employ paleontological information to stratigraphic analysis for exploration and development.

Learning Objectives

- Understand and recognize paleontological applications for borehole correlation
- Understand and design a borehole sampling program for paleontology
- Understand how to recognize geological events from a paleontological range chart
- Learn how to correlate boreholes with only a summary of bioevents
- Learn how to integrate fossil indices and biofacies with other geological data

Course Outline

Applied Paleontology

- Type of fossils and applications
- Logistics and Methods
- Zonations
- EXERCISE: Recognize geological horizons in a range chart

Applied Biostratigraphy

- Bioevents
- Chronostratigraphy and Geochronology
- Correlation
- EXERCISE: Correlating Boreholes with Bioevent Summaries

Applications for Exploration

- Paleoecology, Biofacies, and Paleobathymetry
- Fossil Indices and Biostratigraphic Sequences
- EXERCISE: Biostratigraphic Sequences
- Fossils and Black Shales; finding the oxygen minimum zones

Applications for Development

- Role of mud in the reservoir model
- Mud classification, ecology, and depositional timing
- Fossils and Reservoir Architecture of Fan and Channel complexes

Biographical Sketch



Ryan Weber is currently the President of Paleo-Data, Inc., a biostratigraphic consulting firm serving the Oil & Gas sector for over 50 years. Ryan previously worked for BP as a Gulf of Mexico biostratigrapher. Mr. Weber holds a BS and Education certificate from Minnesota

State - Mankato, and an MS from the University of Nebraska - Lincoln. He also served as the Earth Science Section Chair for the Nebraska Academy of Sciences. Ryan's career has applied biostratigraphy from onshore to deep-water Gulf of Mexico, the interior USA, Egypt Nile Delta, Northwest Australian shelf, offshore Mozambique, Colombia, Alaska, and the Spanish Pyrenees. Ryan's passions include Miocene and Wilcox stratigraphy, Mesozoic paleoceanography, the Minnesota Twins, nostalgic comedies, and fermentation.

Instructor Contact Information:

Ryan D Weber
President & Biostratigrapher
Paleo-Data, Inc
ryan@paleodata.com
M: 504-508-1416

HGS VIRTUAL NORTH AMERICAN DINNER MEETING

MONDAY, OCTOBER 25, 2021

7:00 - 9:00PM

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

[HTTPS://WWW.HGS.ORG/CIVICISM/EVENT/INFO?ID=2312](https://www.hgs.org/civicism/event/info?id=2312)

EVENT CONTACT: MARK HAMZAT O. EROGBOGBO | MARK@PROSPEROOG.COM

The Story of the Kavango Basin, An Unusual Play Emerging in Namibia

In recent months, the project pursued in Pet Expl License 73 in northeastern Namibia by ReconAfrica has, somewhat surprisingly to me, become very high profile for various reasons. The project has its root in recognition since about 2015 that the eastern end of the Owambo Basin actually has a younger, Karoo-aged history and has therefore been distinguished as a deeper dimension to the shallow Neogene "Kavango Basin." Secondly the project had operational limitations because of the blue-sky nature of the project, such that the operations that have been going on in 2021 were not the usual prospect-targeted operations. Stratigraphic wells were drilled to prove up the play concepts, and now seismic acquisition is following that proof-of concept stage of the program. The two wells were wildly successful in proving that a petroleum system is active in this part of the region, further distinguishing Kavango from the disappointing Owambo to the west. But they did prove that my early structural models grossly exaggerate the Karoo fill in the basin. It looks like the program has drilled into pre-Karoo high blocks that contain pieces of the much older Damara fold belt. The Karoo extension seems to have been superimposed on that older structure and dropped it down to levels at or below sea level, a subsidence compared to surface expression of the fold belt that amounts to 1.5 km or more. The project employed some innovative techniques in terms of responsible drilling techniques, and a low-impact seismic acquisition program.

This talk will be in two parts, the first discussing the results of PEL 73 operations insofar as they can be released at the time of the meeting, followed by a Q and A. There will be a short break, followed by the second part, which will delve into the tectonics behind how the play concept was developed, and some geology of this part of Africa. The scientific significance of that work relates to how to approach an extension province from the point of view of the kinematics of the blocks involved: a displacement field approach to extension and inversion in an array of blocks rather than a fault-plane dynamics approach.

Biographical Sketch



Dr. James W. Granath is a consulting structural geologist based in Denver, Colorado, who has worked in academia and industry. Since 1976 he has taught at SUNY Stony Brook and spent 18 years with Conoco Inc. in research, international exploration, and new

ventures. In 1999 he opened a consulting practice focused on structural geology and tectonics as applied to exploration problems, interrupted only by brief periods of exclusivity with Forest Oil and Midland Valley Exploration in Denver. He is a member of AAPG, GSA, AGU, and RMAG, and is a certified petroleum geologist (#5512).

He is the author of numerous research papers and co-edited several multi-author compendia. His expertise lies in seismic interpretation and integration with structural analysis, fracture analysis, regional synthesis, and prospect and play evaluation.

Jim has worked on projects in some 40 countries around the world. Recent notable projects have included the Karoo rifts in Africa, the Kurdistan, Chiapas, and Oaxaca fold & thrust belts, and the Colorado Rockies.

He holds his PhD from Monash University in Australia, and a BS and MS from the University of Illinois at Champaign-Urbana.

October 2021

<i>Sunday</i>	<i>Monday</i>	<i>Tuesday</i>	<i>Wednesday</i>
3 AAPG Mid-Continent Section Meeting HGS Sunday Funday at the Ball Park	4 AAPG Mid-Continent Section Meeting	5 AAPG Mid-Continent Section Meeting	6
10 Earth Science Week October 10 - 16	11 HGS General Dinner "The Impact of the Wichita Uplift on the Anadarko Basin" Page 8	12 SPE-GCS Energy Professionals Hiring Event Page 7 HGS Board Meeting 5 p.m.	13 HGS Environmental & Engineering Dinner Meeting
17	18 HGS Golf Tournament Page 9 HGS Virtual International Dinner "AAPG's Giant Fields Database" Page 11	19 HGS Short Course Encore Presentation "How to Use Paleontology in the Oil & Gas Industry" Page 13	20
24	25 HGS Virtual North American Dinner "The Story of the Kavango Basin, an Unusual Play Emerging in Namibia" Page 14	26	27 Geogulf 2021 Oct. 27-29
31			

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- \$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.

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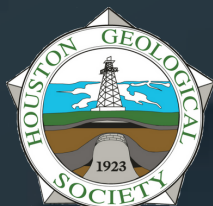
October 2021

<i>Thursday</i>	<i>Friday</i>	<i>Saturday</i>	
	1	2 	<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>
7 	8	9	
14	15 <i>STGS Fall Field Trip</i>	16	
21	22	23	
28	29	30	
			<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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THIRD EAGE/HGS CONFERENCE ON LATIN AMERICA

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SESSION OVERVIEW

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Welcome to the Third EAGE/HGS Conference on Latin America

Latin America – An Exploration Overview

Chairs: Bob Fryklund (IHS) and Daniel Minisini (Shell)

The Atlantic conjugate margin agglutinate the activity of most offshore operators. Analyzing the geological and non-technical risks at continental scale allows ranking the opportunities within the entire conjugate margin, classifying reliable sites against marginal sites, based on criteria derived from the same group of explorers, and on knowledge transferred from databases geographically far apart. Method, data and mindset behind these analyses will be presented to debate among explorers.

Brazil and Guyana are leading the region and the world in new volumes of discovered hydrocarbons. Mexico is in pursuit, but the next several years of deep-water drilling will be critical. Colombia offshore too is in the proof of concept stage and upcoming wells will be critical in determining if there are enough resources for commerciality. In Argentina, the Vaca Muerta is ramping up.

- Still lots of basins remain under-explored.
- Where will the next discovery be?
- What role will future demand and the call for a reduced carbon footprint have?
- Will Venezuela rejoin the marketplace?

Frontier Areas; New Plays and Missed Opportunities **Chairs: Catie Donohue (GeoMark Research) and Mark Olson (Apache)**

The Latin America and Caribbean regions contain about 20% of the global proven oil reserves but the excitement of the area lies in the significantly under explored offshore and unconventional opportunities. Recent exploration work is challenging preconceived models of reservoir presence,

source presence, and tectonic development to identify some compelling new petroleum concepts. From new reservoir provenance models in Mexico, updated crustal type models in the Caribbean and new details on the A-C-T source rock along the equatorial margin, these new ideas are driving frontier exploration and regenerating interest in the area.

Greater Caribbean; Non-Guyana and Suriname

Chairs: Bryan Ott (Hess) and Sean Romito (University of Houston)

The Caribbean Region remains a challenging frontier area located between the prolific oil-rich basins of the Gulf of Mexico and northern South America. Despite a number of gas discoveries in recent years, bold explorers continue their search for the elusive oil field, and the region has seen numerous high-impact wildcats drilled in the recent years. This year BPC spud the Perseverance -1 wildcat targeting Jurassic to Cretaceous carbonates in a large fold on the Bahamas Bank. BHP and partners continue exploring in the deep water areas of Trinidad, where a number of gas discoveries have been made. Elsewhere in the Caribbean, Shell has farmed into offshore Colombia, and ongoing farm-outs continue in Jamaica.

Greater Caribbean; Guyana and Suriname **Chairs: Shawn Wright (Hess) and Ben Kirkland (CNOOC)**

The Guyana-Suriname basin is often considered one of the last remaining under-explored but highly prospective basins in the world. With exception of the discovery of the onshore Tambaredjo and neighboring heavy oil fields in Suriname in the 1960s, a spotted exploration history dating back to the

1920's had been largely unsuccessful. Exploration interest was renewed when a 2002 report by the USGS estimated ~13.6 Bbbls of oil reserves were left undiscovered. Exploration efforts were soon rewarded with the economic discovery of high-quality oil-bearing Late Cretaceous turbidite sands at Liza-1 in the Stabroek block by an ExxonMobil-led partnership in 2015. Following the Liza discovery, additional operators have found success in the basin with discoveries at Jethro and Joe (Tullow-led), Maka, Sapakara, Kwaskwasi, and Keskesi (Apache-led) and Sloanea (Petroneas-led). Since 2015, ~25 commercial discoveries have been made making the Guyana-Suriname basin the most exciting basin on the Atlantic margin. As exploration moves outside of the proven Upper Cretaceous stratigraphic trap play fairway in the SE Stabroek area, the level of technical understanding of the petroleum system is the key to predicting hydrocarbon fluid properties and discovering additional resources. In particular, source rock presence/maturity and reservoir presence/quality are areas of substantial interest. With several high-impact wells in the very near future targeting Paleocene to Jurassic plays, the players in this basin are continually acquiring new information and the future of the Guyana-Suriname basin is bright.

South Atlantic; Non-Brazil

Chairs: Katy Sementelli (BHP) and Corey Moss (Murphy)

Industry activity has recently shifted south to the countries of Argentina and Uruguay with successful bid rounds held in each country in 2018 and 2019. Both countries saw an increase in interest in Frontier Offshore blocks with awards going to supermajor partnerships in Argentina (Shell, XOM, Total) and independents operators in both countries (BPC in Uruguay, for example). Recent seismic acquisition and reprocessing of data have expanded interest in new play ideas, such as stratigraphic traps in deep-water reservoirs, and revisiting known plays in new areas (Malvinas Basin). Uruguay has revamped the bid-round process to include an open-round formula for flexible options in generating interest in both offshore and onshore acreage. Argentina has put the 2020 round on hold in light of economic investment concerns related to the COVID19 pandemic. However, activity in the region has not stalled with seismic acquisition associated with work commitments continued in 2020. Optimism in the Southern Atlantic was enhanced with a discovery in 2019 in the Outeniqua basin off South Africa by Total with the Brulpadda well. Further excitement continues with a well of interest; Total's Venus-1 wildcat targeting a major ultra-deep water prospect in the Orange Basin offshore Namibia which may confirm the Cretaceous source potential in the South Atlantic. Frontier exploration continues in the Southern Atlantic areas.

South Atlantic; Brazil

Chairs: Bill Dickson (DIGs) and Marcus Zinecker (BP)
Equatorial Margin - huge region, unclear potential
Vast region with potential for Upper Cretaceous & younger fan plays analogous to Jubilee (offshore Ghana) and Zedyus (offshore French Guiana). Restrained by lack of infrastructure except Potiguar/Ceara (easternmost basins) where existing onshore and shallow water fields mature. Undeveloped deepwater discoveries at Pecem, Pitu, Tango.

Southeast Margin - giant and super-giant discoveries & production; unexplored potential

2021 excitement includes:

Sergipe: ExxonMobil well on an outboard ultra-deep-water block, perhaps testing two new play types (contourite sands, carbonate buildups on rift-age volcanic features) which could require sourcing from Aptian seaward dipping reflectors interbeds where younger A-C-T marine source is too shallow or absent.

Campos: probe ultra-deep-water targets with both post-salt A-C-T marine source pods; and usual syn-rift-sag lacustrine source. Post-salt targets include contourites in lows; pre-salt CO3 targets difficult to image and a really reduced by lack of regional top seal resulting from extensive salt movement.

Santos: 3D mapping of present-day pre-salt structuration is excellent; reservoir facies inversions are good; but insufficient. Need better understanding of basin evolution at crustal level to improve models of thermal history, CO2 and volcanic pathways, source facies distributions.

Pacific Margin; Onshore and Offshore

Chairs: Lucia Torrado and Leo Liu (Chevron)

The Pacific Margin of Latin America has one of the largest concentrations of oil seeps in the world. With several mature Cretaceous to Cenozoic source rocks, reservoirs like turbidite sandstone, extensive seal rocks and multiple, combined trapping mechanisms, the Latin America's convergent margin is proving to be an attractive area ready to be explored. The increased availability of high-quality data and farm-ins from major O&G companies like Equinor in Nicaragua's Sandino basin, and Tullow Oil, BP and Oxy's in the Peruvian offshore are an encouraging indicator of the value and potential of this margin.

Mexico

Chairs: Stan Ingram (CNOOC) and Mike Durcanin (Murphy)

Mexico is a major petroleum producing country with numerous proven basins, including the both the Salina del Istmo and Sureste "Super Basin" with ~60 BBOE of recoverable reserves. These offshore basins are characterized by world-class mature source rocks with numerous reservoir - seal pairs proven in several different stratigraphic intervals similar to its northern counterpart. Unlike the US GoM however, initial exploration and development generally focused mainly on both shallow-water Cretaceous and Jurassic carbonates. As such, the deeper water clastic Neogene/Paleogene plays attracted little interest until now. Following the historic energy reform in 2013, five offshore license rounds were held between 2014 - 2018 with participation from 25 companies that bid over 50 exploration wells and numerous seismic acquisition programs across 55 licenses. With the exception of the giant Zama discovery (roughly 700+ mmbbl recoverable) within the Upper Miocene play in the Sureste basin and minor successful step outs within this play (i.e. Cholula, Saskeen), exploration results thus far have been disappointing. Recently, the newest discovery, Polok-1, confirmed a commercially viable petroleum system in the Lower Miocene. To date, as over half of the initial commitment wells remain to be drilled, Mexico remains an exciting location for exploration activity in 2021 and beyond.

TECHNICAL PROGRAMME

Oral Presentations | Tuesday 9th November 2021

08:30	Welcome by Mike Erpenbeck & Ceri Davies
	Latin America: Scene Setter Session Chairs: Bob Fryklund & Daniel Minisini
08:45	Future of Latin America - Exec Panel Hosted by Bob Fryklund
09:30	Present and Future of Latin America Fernando Sanchez-Ferrer ¹ ¹ Independent
10:00	Role of Conjugate Margins - Jim Pickens ¹ ¹ Shell
10:30	Break
	Non Guyana-Suriname Session Chairs: Bryan Off & Sean Romito
10:40	Exploring an Active Transformation Margin South of the Cayman Trough Chris Matchette Downes ¹ ¹ CaribX
11:05	Controls on Deposition and Reservoir Character of Atypical Shallow-water Tropical Carbonate Systems: Miocene, Cicuco Field, NW Colombia - Angela Torres-Zamora ¹ ¹ University of Kansas
11:20	Unravelling the Mid Miocene Exploration Upside of the Ortoire Block, Onshore SE Trinidad - Xavier Moonan ¹ ¹ Touchstone
11:45	Break
12:00	Guest talk & Lunch: Guyana Tim Chisholm ¹ ¹ Hess
12:45	Break
	Guyana-Suriname (Part 1) Session Chairs: Shawn Wright & Benjamin Kirkland
12:50	Deepwater Hydrocarbon Migration and Focus Challenges Explored in the Suriname-Guyana Basin Melissa Braun ¹ ¹ Chevron
1:15	3D Gravity Inversion Supports the Guyana-Suriname Rifted-passage Margin of Jurassic Age: But where is its Conjugate? Kenneth Shipper ¹ ¹ University of Houston
1:30	Analysis of the Poly-phase Plate-Margin Processes of Primary Influence on Jurassic and Cretaceous Basin Development in Guyana-Demerara and Conjugate Guinea Plateau Basins Katya Casey ¹ ¹ Actus
1:55	Break
	New Plays/Missed Opp. Session Chairs: Catie Donohue & Mark Olson
2:05	New Evidence From Regional Source Rock Correlations and Tectonic Reconstructions Point the Way to an Upper Cretaceous Source Rock Depositional Fairway in the Caribbean Paul Ryan ¹ ¹ Unifed
2:30	Mesozoic Carbonate and Evaporites Bahamas SA Epstein ¹
2:55	Geologic Framework for Critical Risk Factors Analysis of a Tertiary Carbonate Play in Colombian-Venezuelan Sedimentary Basin Along the Caribbean Margin of SA Juan Aminio ¹ ¹ Independent
3:20	Break
	South Atlantic: Non-Brazil Session Chairs: Katy Sementelli & Corey Moss
3:25	The Role of Geophysics in Addressing The Multiple Challenges Facing Development of Vaca Muerta, Argentina Luis Venengo ¹ ¹ PanAmerica
3:50	Prospectivity of the Colorado Basin, Offshore Argentina Steve Devito ¹ ¹ Independent
4:15	Atlantic Margin Unexplored Play Fairway Sweet Spot with Significant Hydrocarbon Potential Neil Hodgson ¹ ¹ Searcher
4:40	Close

Oral Presentations | Wednesday 10th November 2021

08:30	Welcome by Mike Erpenbeck & Ceri Davies
	México Session Chairs: Stan Ingram & Mike Durcanin
08:40	Column Height Guidelines for Undrilled Prospects in Mexico Mark Shann ¹ ¹ Geomarcas/Sierra
09:05	Volcaniclastics in Cholula-1EXP, Salina del Istmo Basin, Mexico Stan Stanbrook ¹ ¹ Murphy
9:30	Regional Source Rock Maturity Modeling Along the Campeche Salt Basin, Southern Gulf of Mexico Md Nahidul Hasan ¹ ¹ University of Houston
9:45	Break
	Pacific: Onshore & Offshore Session Chairs: Lucia Torrado & Leo Liu
9:55	Cretaceous-Cenozoic Tectonostratigraphic Evolution and Hydrocarbon Prospectivity of the Sandino Forearc Basin, Offshore Nicaragua- Paul Mann ¹ ¹ University of Houston
10:10	Assessing the Regional Effects of the Miocene-to-Recent Panama arc Collision and its Influence on the Maturation and Distribution of Hydrocarbons in - Juan Pablo Ramos ¹ ¹ University of Houston
10:25	Peruvian Petroleum System Assessment with a Focus on Offshore Basins- Craig Schieleben ¹ ¹ Independent
10:50	Break
	Greater Caribbean: Guyana-Suriname (Part 2) Session Chairs: Shawn Wright & Benjamin Kirkland
10:55	Oil and Source Rock Geochemistry of the Guyana Basin Andres Cedeno ¹ ¹ University of Stavanger
11:20	Distinguishing Petroleum Source Rock Acmes Across Northern South America: Application to Evaluate the Potential of the Albian to Maastrichtian Guyana Basin Daniella Easley ¹ ¹ University of Houston
11:35	An Integrated Approach of Forward Source Rock Modeling in the Suriname-Guyana Basin - Yushi Zhao ¹ ¹ Chevron
12:00	Break
12:10	Guest talk & Lunch: The Outlook for High Impact Exploration in Latin America - Graeme Bagley ¹ ¹ Westwood Energy
12:55	Break
	South Atlantic: Brazil (Part 1) Session Chairs: Bill Dickson & Marcus Zinecker
1:00	Rift Associated Magmatism in the Sergipe-Alagoas Basin Tono Martin Monge ¹ ¹ Repsol
1:25	Petroleum System Evolution in the Outboard Atlantic Margin of Campos and Santos Basin Hualing Zhang ¹ ¹ Ripied/University of Houston
1:40	Rift-Associated Magmatism in the Sergipe-Alagoas Basin and its Influence on Local Petroleum System Mariana Mirelles ¹ ¹ Petrobras
2:05	Break
	South Atlantic: Brazil (Part 2) Session Chairs: Bill Dickson & Marcus Zinecker
2:10	Onshore Exploration in Brazil - Potiguar Richard Lane ¹ ¹ PetroVictory
2:35	Geological Sources of CO2 in Santos, Campos and Espírito Santo Basins Sharon Cornelius ¹ ¹ University of Houston
3:00	Huge Structures Associated to Novel Deformation as Seen in New 3D Data in the Pre-Salt of Santos Basin Pedra Zalan ¹ ¹ ZAG Consulting in Petroleum Exploration
3:25	Wrap up/Awards

CONTACT US FOR MORE INFORMATION
AMERICAS@EAGE.ORG • +57 310 8610709
HGSLATINCONFERENCE2021@GMAIL.COM • + 1 713 463 9476

EAGE
MEMBER
ASSOCIATION OF
GEOPHYSICISTS &
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HEAD OFFICE
+31 88 995 5055
EAGE@EAGE.ORG
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+7 495 640 2008
MOSCOW@EAGE.ORG
WWW.EAGE.RU

MIDDLE EAST OFFICE
+971 4 369 3897
MIDDLE_EAST@EAGE.ORG
WWW.EAGE.ORG

ASIA PACIFIC OFFICE
+60 3 272 201 40
ASIAPACIFIC@EAGE.ORG
WWW.EAGE.ORG

LATIN AMERICA OFFICE
+57 3108610709
AMERICAS@EAGE.ORG
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"Water Today and for the Future"

10-16 October 2021



Since October 1998, the American Geosciences Institute has organized this national and international event to help the public gain a better understanding and appreciation for the Earth sciences and to encourage stewardship of the Earth. This year's Earth Science Week will be held from October 10 - 16, 2021 and will celebrate the theme "Water Today and for the Future." The coming year's event will focus on the importance of learning how to understand, conserve, and protect water, perhaps Earth's most vital resource.

Earth Science Week 2021 learning resources and activities will engage young people and others in exploring the importance of water — and water science — for living things, Earth systems, and the many activities that people undertake. Individuals of all backgrounds, ages, and abilities will be engaged in building understanding of water's role in timely topics including energy, climate change, the environment, natural hazards, technology, industry, agriculture, recreation, and the economy.

Reaching over 50 million people annually, AGI leads Earth Science Week in cooperation with its sponsors and the geoscience community as a service to the public. Each October, community groups, educators, and interested citizens organize celebratory events. Earth Science Week offers opportunities to discover the Earth sciences and engage in responsible stewardship of the Earth. Details about this year's events will be announced in the coming months.

Mission

Earth Science Week promotes the understanding and appreciation of the value of Earth Science research and its appreciation and relevance to our daily lives. The Houston Geological Society is honored to join in this celebration that is organized nationally by AGI each year.

Objectives

- To engage students in discovering the Earth sciences.
- To remind people that Earth science is all around us.
- To encourage Earth stewardship through understanding.
- To motivate geoscientists to share their knowledge and enthusiasm about the Earth.

Volunteer

This event provides a lot of opportunities for our members to give back to the community and share our passion for science. If you would like to take part, please contact the Earth Science Week Committee Chair, Lynn Travis.

Earth Science Week: Art, Essay, and Multimedia Contest more information can be found at

<http://www.earthsciweek.org/contests>

The Houston Geological Society will hand out maps and take-home craft activities at the Houston Museum of Natural Science. Please check the HGS website for updates and announcements.



Please join us for the IAGC 50th Anniversary Annual Conference as we celebrate our historic milestone, featuring one of the greatest speaker lineups to date. We invite you to attend the conference at The Westin Houston, Memorial City Hotel either virtually or in-person, on 20 October. Space is limited to the first 125 in-person; reserve your spot today!

In addition to celebrating IAGC's 50 Years of Energy Transformation, as the only global trade association representing the G&E industry, we welcome you to join us for a special reception celebrating "100 Years of Seismic".

Founded in 1921, this year marks the 100th anniversary of the invention of seismic survey technology. This momentous event will immediately follow our conference and is generously sponsored by the Society of Exploration Geophysicists (SEG) and Axiom Marketing Group (Axiom). We look forward to celebrating our industry's contribution to bringing affordable and accessible energy to the world for the next 100 years!

Please use the linked registration form below and register for conference and attend the reception at no additional cost, or for the reception only.

Traveling from out of town or prefer to stay at the hotel after the reception; hotel rooms are available to those attending in-person at a discounted rate [HERE](#).

To REGISTER please fill out this form [HERE](#)! Use organization code **HGS50**.



Click [HERE](#) for the registration form. Use organization code **HGS50** to register at a reduced rate!

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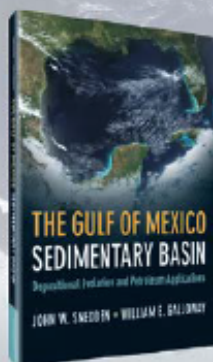
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HGS Bulletin Instructions to Authors

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

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

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

Photographs may be digital or hard copy. Hard copies must be printed on glossy paper with the author's name, photo or figure number and caption on the back. Digital files must be submitted in .tif, .jpg, or .eps format with 300-DPI or greater resolution at the printing size and 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.

HGS Bulletin Advertising

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

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

Website Advertising Opportunities

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

Placement	Rate	Specifications/Description
HGS Website Home Page Banner Ad	\$800 – Monthly	275 x 875 pixels; home page top banner ad. All Home Page Banner Ads rotate every 10 seconds.
	\$1800 – 3 Months	
	\$2800 – 6 Months	
	\$3600 – 12 Months	
HGS Website Home Page Column Ad	\$700 – Monthly	200 x 400 pixels; home page right column ad
	\$1500 – 3 Months	
	\$2400 – 6 Months	
	\$3600 – 12 Months	
HGS Website Event Page Ad	\$600 – Monthly	200 x 400 pixels; calendar page left column ad. All Event Page Ads rotate every 10 seconds.
	\$1200 – 3 Months	
	\$1600 – 6 Months	
	\$2600 – 12 Months	
Geo-Jobs	\$50 – 14 days	Posting of job opportunities on HGS website. Click the Geo-Jobs tab to get started. Must be filled out completed and the dates set appropriately.
	\$100 – 30 days	
	\$300 – 3 Months	
	\$600 – 6 Months	
	\$1200 – 12 Months	
Vendor Corner	\$250 *4 Pack option with 1 FREE bonus event for \$1000.00 available. Send request to vendorcorner@hgs.org .	Company logo, company website, and company description will be highlighted on HGS Calendar website event. This is an opportunity to display company wares, gain personnel exposure and hand out product information at HGS dinner meetings.
Event/Short Course Calendar Ad	\$100 – Monthly	An event ad posted within the HGS website calendar under the Events tab.
Bundle & Save!	<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. 	



APPLICATION TO BECOME A MEMBER OF THE HOUSTON GEOLOGICAL SOCIETY

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.
- Be a full-time student enrolled in geology or in the related sciences.

Apply online at www.hgs.org and click "Join HGS". Annual dues expire each June 30.

Annual dues are \$30; Emeritus members pay \$15; Students are free.

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

Full Name _____ Membership Type (choose one): Active Associate Student

Current Email (for digital Bulletin & email newsletter) _____

Phone _____

Preferred Address for HGS mail _____

Employer (required) _____ Job Title (**required**) _____

Will you volunteer? (Y/N) _____ Committee choice: _____

Active & Associate membership for one year (July 1st - June 30th) \$30.00 _____

Student membership \$0.00 _____

OPTIONAL Scholarship Contributions: Calvert/HGS Foundation-Undergraduate \$5.00 _____

Total Remittance _____

Payment

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Degree (**required**) _____ Year Graduated _____

School (*optional*) _____ Major (*optional*) _____

Degree (*optional*) _____ Year Graduated _____

Years Work Experience (**required**) _____

Please submit a brief statement regarding your work experience in the practice or application of earth science or an allied science.

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Signature: _____ Date: _____

Professional Directory

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