

# Bulletin

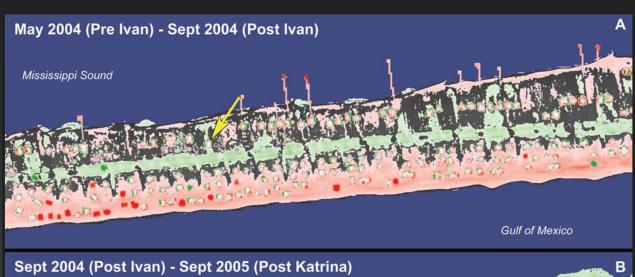
Volume 48 Number 3

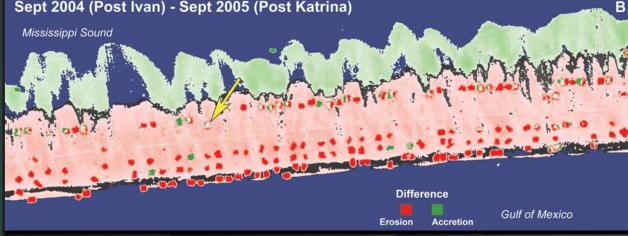
**Houston Geological Society** 

November 2005

Discover
New Pay in a
Mature Play;
Integrate 3D
Seismic and
Geology —
Lafourche
Parish,
Louisiana
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Dauphin Island, Alabama

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# The Bulletin Houston Geological Society

Volume 48, Number 3 November 2005

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About the cover: Dauphin Island, AL. LIDAR Map views of post-storm difference grids for Hurricanes Ivan (A) and Katrina (B), and vertical photography of the same location (C). The LIDAR images show elevation gains (green) and losses (red). Images courtesy of the USGS

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The Houston Geological Society Bulletin (ISSN-018-6686) is published monthly except for July and August by the Houston Geological Society, 10575 Katy Freeway, Suite 290, Houston, TX 77024. Phone: 713-463-9476, fax: 713-463-9160 Editorial correspondence and material submitted for publica-

Editorial correspondence and material submitted for publication should be addressed to the Editor, Houston Geological Society
Bulletin, 10575 Katy Freeway, Suite 290, Houston, TX 77024 or to
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Subscriptions: Subscription to this publication is included in the membership dues (\$24.00 annually). Subscription price for nonmembers within the contiguous U.S. is \$30.00 per year. For those outside the contiguous U.S. the subscription price is \$46.00 per year. Single-copy price is \$3.00. Periodicals postage paid in Houston Towas

POSTMASTER: Send address changes to Houston Geological Society Bulletin, 10575 Katy Freeway, Suite 290, Houston,

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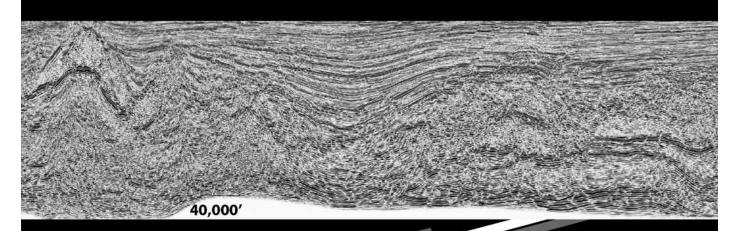
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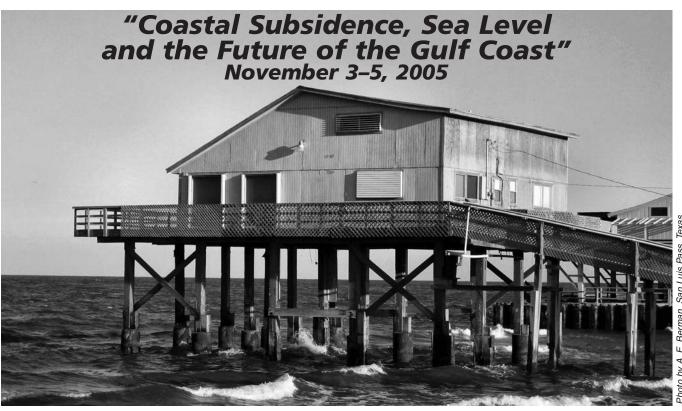


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#### A Conference to increase awareness of subsidence issues facing the Gulf Coast Region

Sponsored by: Houston Geological Society and Engineering, Science & Technology Council of Houston

November 3, 4, and 5, 2005 - 8:30 am - 5:30 pm ● Registration Table opens at 7:30 am

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## Geology is not just a Career; it is an Avocation

If you have been

wondering what is

happening within

HGS, www.hgs.org is

the place to find it.

Trecently had the pleasure of having lunch with approximately two dozen of the past presidents of the Houston Geological Society.\* The occasion was the induction of Steve Levine into this exclusive group. The membership roll reads like a who's who in geology in Houston and the United States. At least four HGS past presidents are also past presidents of AAPG. One thing they all have in common is a continuing interest in the affairs and the well being of HGS. You have probably sat next to one of these individuals at a lunch or dinner meeting and did not realize it. I was initially surprised that nearly all of the attendees are still active in the practice of geology on a daily basis. Actually, there is no reason to be surprised. It does not require physical strength or steady hands. It only requires experience and mental acuity; that is something that our former presidents have in abundance.

Geology is not just a career; it is an avocation. We are geologists by choice, not by default. This is a lifetime love affair, not a one-night stand.

I want to congratulate Steve on his induction into such a distinguished group and thank him for his exemplary service to the HGS during his year as president. He can be proud of many of the accomplishments of HGS during his tenure, but I think he should be most proud of his initiation of the scholarship dance in support of our

two scholarship funds and the return of HGS to the support of public service projects, such as the reclamation of the Evergreen Cemetery. Thank you, Steve.

As chairman of the nominations committee, Steve will certainly be calling some of you in the near future to request that you run for one of the management positions on the board. Please tell him yes. You will not be sorry, and just think about all the dedicated, first-class professionals with whom you will get a chance to associate. Better yet, give him a call and tell him you are interested in a position on the HGS board. Look at it as a way to upgrade your networking.

Once again, the members of the HGS International Explorationists Group are to be congratulated for staging a very successful Africa E&P symposium (page 27). HGS and the

Petroleum Exploration Society of Great Britain host this annual conference. The next two conferences will be held in London; therefore, you will need to wait until 2008 for a return engagement in Houston. The considerable efforts exerted by the conference volunteers on both sides of the Atlantic have made this the premier conference on African E&P in the world. The conference covers all aspects of African E&P, with particular emphasis on new ideas for exploration, the geology of the African continent, the application of emerging technologies and case histories of African discoveries. If this is your area of geological pursuit, you will want to be at the Africa E&P symposium in the fall of 2008.

Fall 2008 will be a busy time for the Houston Geological Society.

The GCAGS convention returns to Houston in 2008 (page 46). If you have been saving the perfect talk, or if you have been nurturing a new idea about the geology of the Gulf Coast, this will be the perfect time and place to bring it forward.

You will not need to wait until 2008 for a significant conference in Houston. HGS joins the Engineering, Science and Technology Council of Houston in presenting a conference on Gulf Coast subsidence on November 3 through 5

(page 4). Data indicate that benchmarks in south Louisiana are sinking at alarmingly fast rates. If these subsidence rates continue for the next 50 years, you may be able to see the Louisiana coast line from I-10. Ground water withdrawal may be the primary cause of subsidence in Houston, but it may not be the only cause or even the primary cause along much of south Louisiana or eastern coastal Texas. This conference will provide a forum to explore all of the possible causes of coastal subsidence. Federal and state agencies are preparing remediation plans, which are likely to cost several millions of dollars. The intent of the conference is to help those involved in the planning process focus on the root cause and not the perceived cause of subsidence. It is unlikely that a single solution to the problem of subsidence and the process to deal with it will apply uniformly across the Gulf Coast. Mother Nature is not that consistent. This conference may not provide the final answer to the issue of coastal From the President continued on page 9



#### 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.

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

Figures, maps, diagrams, etc., should be digital files using Adobe Illustrator, Freehand, Canvas or CorelDraw. Files should be saved and submitted in .eps (Adobe Illustrator) format. Send them as separate attachments via email or on a diskette or CD if they are larger than 1 MEG 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.

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by Paul Britt editor@hgs.org

## The Sword of Damocles, continued

The cumulative

offshore shut-in oil

and gas for the period

from August 26 to

September 28 is

37.9 MMBO and

180.6 BCF.

TOP TEN REASONS YOU MIGHT BE A GEOLOGIST: \* 8. Your rock garden is located inside your house. next month, reason no. 7...

t the time of this writing, the Gulf Coast has suffered the  $m{\Lambda}$ effects of Hurricanes Katrina and Rita, and the season still has about 10 weeks to go. These two storms have wrought

unprecedented damage on the coast of Louisiana, and threatened the upper coast of Texas. The news industry has been saturating us with the effects of the storms on people, cities and towns, buildings and neighborhoods. The obvious human-interest stories have been presented from every angle. The effects of these storms on oil and gas infrastructure, coastal sedimentary processes, marine navigation and other earth science related interests are also undergoing detailed study. The US Geological Survey (USGS), National Oceanic and Atmospheric Agency (NOAA), NASA, the Minerals Management Service (MMS) and various academic organizations such as Louisiana

State University, the Bureau of Economic Geology and others are already conducting studies and evaluations of the effects of these storms on the Gulf Coast.

A review of agency websites and oil industry newsletters yields interesting views of the catastrophic changes as a result of the hurricane forces.

#### Offshore Oil and Gas Production

The damage from Hurricane Rita is still being compiled at the time of this writing, but at least two missing jack-up rigs were found nearly 80 miles from their drill sites. GlobalSantaFe's Adriatic VII and GSF High Island III appeared to have sustained severe damage during Hurricane Rita. Reports of other damage to rigs and platforms is now coming in.

Damage resulting from to Hurricane Katrina has already been compiled by the MMS. The agency reports that 46 mostly lowproducing structures were destroyed, 20 producing structures had extensive damage and four drilling rigs, one jack-up and three platform rigs, were destroyed. Nine drilling rigs have extensive damage and six rigs were set adrift, though they have now been located and remanned.

The MMS also compiled daily evacuation and production shut-in statistics that are presented on its website. On September 29 the MMS reported 593 platforms and 64 drilling rigs evacuated due to Rita. These evacuations are equivalent to 72.4% of the 819

> manned platforms and 47.76% of the 134 rigs currently operating in the Gulf. The MMS reports daily shut-in production of 1,511,715 BOPD and 8,027.3 MMCF/D because of both Katrina and Rita. The 1.5 million barrels of oil per day is 100% of the oil production, and 8.027 BCFG/D is over 80% of the daily gas production in the Gulf of Mexico.

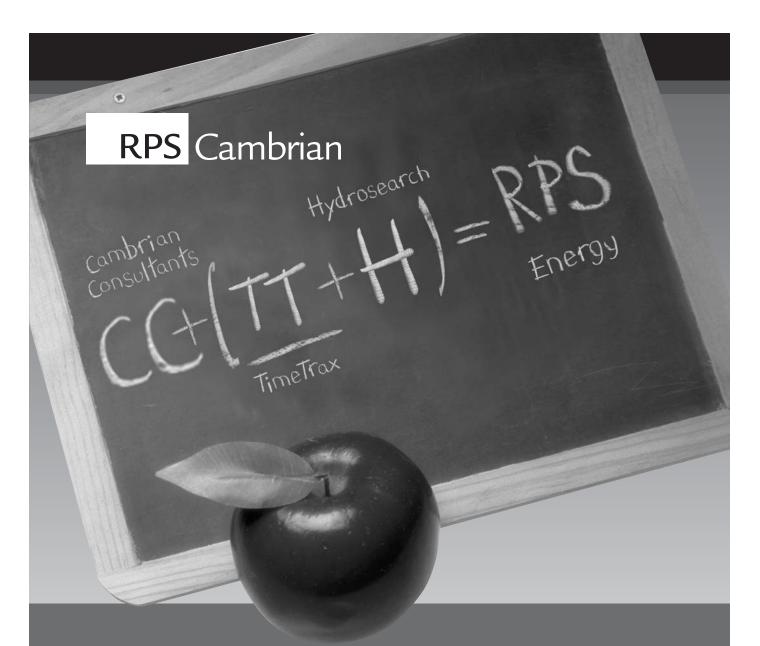
> the period from August 26 to September 28 is 37.9 MMBO and 180.6 BCF. These figures represent nearly 7% of the oil and 5% of the total yearly production from the Gulf of Mexico!

> The cumulative offshore shut-in oil and gas for

According to the DOE, May 2005 daily oil demand in the United States averaged 20.139 MMBOPD. That means that on September 29, approximately 7.5% of the US daily demand for oil was unavailable due to Hurricanes Katrina and Rita. Not included in these figures are all of the onshore production that is shut-in because of pipeline hubs and terminals which are shut down due to the storms. The total shut-in production resulting from Hurricanes Katrina and Rita are actually much higher.

#### **Coastal Depositional Processes**

USGS Coastal and Marine Geology Program investigates the extent and causes of coastal impacts of hurricanes and extreme storms on the coasts of the United States. The objective is to improve the capability to predict coastal change that results from severe tropical and extra-tropical storms. Scanning airborne laser altimetry (LIDAR), oblique aerial photography and ground surveys are methods used in these studies. The cover photo is such an illustration, using LIDAR and aerial photography in the presentation of erosion and accretion on Dauphin Island offshore Alabama (Figures 1 and 2 and Cover). From the Editor continued on page 9



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#### From the President continued from page 5

subsidence and what to do about it, but it will provide a venue for the discussion of the possibilities. If you have not already signed up, you do not have much time left.

Check our Web site for details on the subsidence conference and the many other HGS activities. If you have been wondering what is happening within HGS, www.hgs.org is the place to find it. If

you are not connected to the Internet, ask your grandkids to print out our calendar page.

\*EDITOR'S NOTE: A composite photograph taken at the Past President's Luncheon appears on page 26 of the October issue of the Bulletin. Past Presidents back to the year 1954 were in attendance.

#### From the Editor continued from page 7\_



Figure 1. Location Map

In a cooperative research program, the USGS, NASA and the US Army Corps of Engineers (USACE) are using airborne laser mapping systems to survey coastal areas before and after hurricanes. As

the aircraft flies along the coast, a laser altimeter (LIDAR) scans a several hundred meter wide swath of the earth's surface to acquire an estimate of ground elevation approximately every square meter. The elevation data from different flights can be compared to determine the patterns and magnitudes of coastal change and the loss of buildings and infrastructure. Figure 2 shows an oblique view of Dauphin Island with an exaggerated vertical scale.

In Figure 3, one of five locations studied by the USGS, a portion of the Chandeleur Islands is shown before and after Hurricane Katrina. The Chandeleur Islands are a north-south oriented chain of low-lying islands located approximately 100 kilometers east of New Orleans. The first image was taken in July 2001, before Hurricanes Lili (2002), Ivan (2004), Dennis (2005), and Katrina (2005, the strongest and closest to the Chandeleurs). The second image was taken on August 31, 2005, two days after Hurricane Katrina made landfall on the Louisiana and Mississippi coastline. The website for the USGS Hurricane and Extreme Storm Impact Studies contains many such examples.

The Mississippi mainland was impacted by storm surge, with great destruction of man-made structures and foliage. The beach erosion is also evident. Figure 4 shows aerial photos taken at Gulfport, Mississippi before and after Katrina. Holly Beach, Cameron Parish, is shown in Figure 5 (page 57) before and after Hurricane Rita.

The effects and threats from hurricanes and extreme storms is a very real danger to all Gulf Coast activities and industries. Studies of these catastrophic events will not only help to develop urban and rural land use plans for future such events; they will also give us insight to the depositional processes and changes that result from such storms. From the Editor continued on page 11

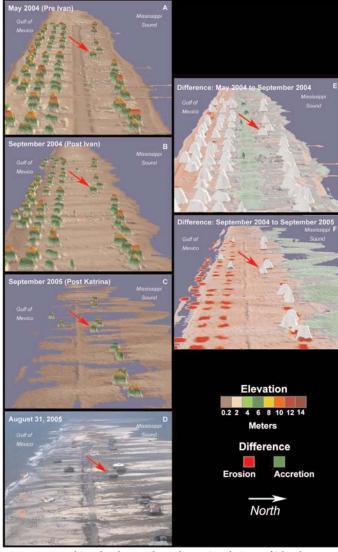
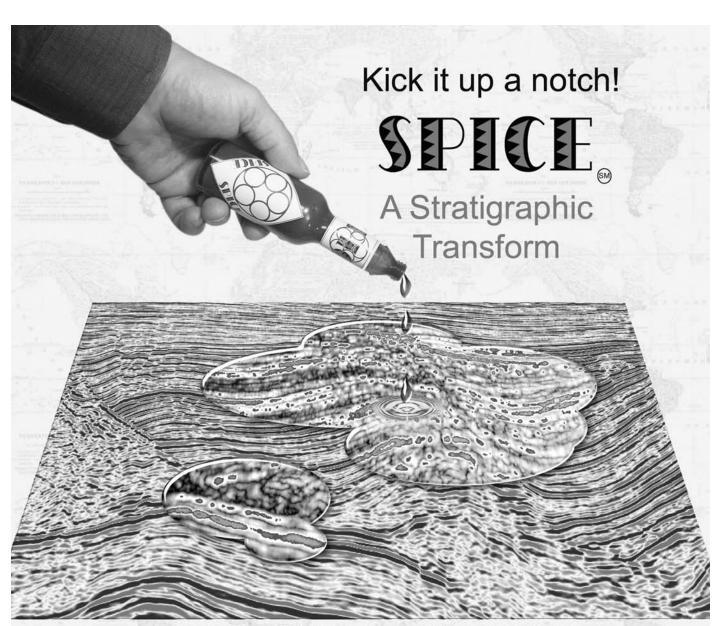


Figure 2: Dauphin Island, AL. Three-dimensional views of island topography (A-C), post-Katrina oblique aerial photograph (D), and differences in topography from Hurricanes Ivan (E) and Katrina (F). The view is along the island, looking from east to west, with the Gulf of Mexico to the left and Mississippi Sound to the right. LIDAR elevation images (A-C) show elevations above mean high water. The rounded appearance of houses is an artifact of the spatial resolution of the data and the gridding process. (Photo and caption courtesy of the USGS)



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#### From the Editor continued from page 9

EDITOR'S NOTE: The images in this article, along with their captions, were provided by the USGS. The shut-in production figures were taken from the MMS Website. These sites are a vast source of illustrations and data that could not possibly be portrayed in a brief article in the HGS *Bulletin*. The USGS site contains data from many storm studies. It is recommended that the readers that have an interest in this topic visit those Websites, where new data is being presented on a daily basis.

The Top Ten Reasons You Might Be A Geologist will be presented, one at a time, each month for all ten issues this year. Please see the

July 17, 2001



Figure 3: Chandeleur Island chain, LA. The first image, taken in July 2001, shows narrow sandy beaches and adjacent overwash sandflats, low vegetated dunes, and backbarrier marshes broken by ponds and channels. The second image shows the same location on August 31, 2005, two days after Hurricane Katrina made landfall on the Louisiana and Mississippi coastline. Storm surge and large waves from Hurricane Katrina submerged the islands, stripped sand from the beaches, and eroded large sections of the marsh. Today, few recognizable landforms are left on the Chandeleur Island chain. (Photo and caption courtesy of the USGS)

Editor's Letter each month, and feel free to send in your favorite "Reason You Might Be A Geologist" for possible publication in the list

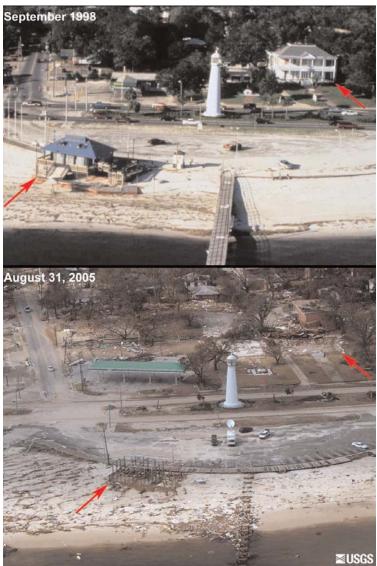
#### **Recommended websites:**

MMS Hurricane Shut-In Statistics: www.mms.gov

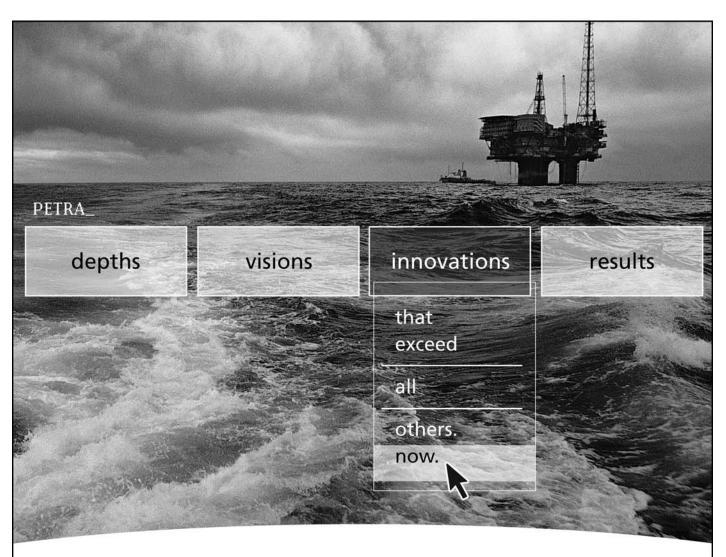
USGS Hurricane and Extreme Storm Impact Studies: http://coastal.er.usgs.gov/hurricanes/

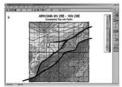
Oil demand: http://www.eia.doe.gov/emeu/international/petroleu.html#IntlConsumption

Figure 4: Biloxi, MS. In the top image, taken in 1998, notice the pier, pier house, and the antebellum house. The bottom image shows the same location on August 31, 2005, two days after Hurricane Katrina made landfall. This photo shows the complete destruction of these landmarks. (Photo and caption courtesy of the USGS)

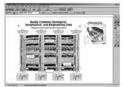


From the Editor continued on page 56





Faulted contours
Isopachs
Volumetrics
Grid operations
New flexing options



CROSS SECTIONS

New Unassigned Tops
Digital and/or Raster
Geocolumn shading
Stratigraphic/Structural
Shade between crossover
Dipmeter data



MAPPING OPTIONS

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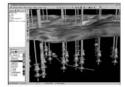
Bubble maps

Production charts

Log curves

Posted data

Highlighted Symbols



3 D VISUALIZATION

Deviated wellbores

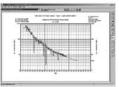
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## SPE/HGS Joint Luncheon Meeting

by **Aubrey McClendon, CEO** Chesapeake Energy

#### PLEASE NOTE: REGISTRATION IS THROUGH SPE

Online registration will be handled through the SPE webpage at: http://www.spegcs.org/en/cev/?830 **Online credit card registration is encouraged.** For those that cannot register on-line, contact the SPE-GCS office at FAX number 713-779-4216 or telephone number 713-779-9595.

# Chesapeake's Thoughts on the Future of the U.S. Gas Industry

Chesapeake Energy Corporation is the third largest independent producer of natural gas in the United States, owning interests in approximately 21,500 producing oil and gas wells, trailing only Devon and Anadarko. The company's estimated proved reserves were 5.9 trillion cubic feet of natural gas equivalent as of June 30, 2005. Recently, Chesapeake has been among the most active drillers of new wells in the U.S., drilling 561 operated wells and

participating in another 890 wells drilled by other operators. This level of drilling activity ranks the company as the most active driller of new wells in the U.S. During the first half of 2005, Chesapeake drilled 413 operated wells and participated in another 505 wells drilled by other companies, with an overall drilling success rate of 98%.

Chesapeake is one of the independent oil and gas industry's most focused natural gas producers with 99% of the company's assets concentrated in six major onshore operating areas: the Anadarko and Arkoma

basins in the Mid-Continent region; the South Texas and Texas Gulf Coast regions; the Permian Basin of West Texas and eastern New Mexico; the Barnett Shale area of north-central Texas; and the Ark-La-Tex areas of East Texas and northern Louisiana. This area, Chesapeake's "Circle of Gas", is characterized by long-lived natural gas reserves, established production profiles and an abundance of growth opportunities, both through the drill bit and through acquisitions. These are areas in which the company believes advanced 3-D seismic geological interpretations, deep exploratory drilling, and expertise in complex land transactions should provide continued opportunities for strong production growth and attractive returns on invested capital. In each of the

operating areas, properties are concentrated in locations that establish substantial economies of scale in drilling and production operations and facilitate the application of more effective drilling and reservoir management practices. The company strategy is to continue building an asset base in primary and secondary operating areas through a balance of acquisitions, exploitation, and exploration.

The success of Chesapeake's repositioning from 1998 though today is apparent in its growth to become the nation's third-largest independent natural gas producer.

#### **Company History**

Chesapeake's first drilling efforts 1991-1993 focused on the Golden Trend and Sholem Alechem fields in southern Oklahoma and on the Giddings Field in southeast Texas. Chesapeake's early successes were supported by a number of industry and financial partners, including ARCO Oil and Gas Corporation (now part of BP PLC), Amerada Hess Corporation, and others.

Chesapeake drilled a major deep gas discovery in early 1994 at Navasota River

in the deep portion of the Giddings Field in Texas. During the period 1994-1996, Chesapeake and its industry partners located almost one TCF of new gas reserves using state-of-the-art horizontal drilling technology in the deep and highly pressured Austin Chalk formation in Giddings. As the company's production and reserves grew dramatically, so did the company's common stock price.

Aubrey K. McClendon and Chief Operating Officer, Tom L. Ward have been partners in the natural gas exploration business since 1983. At that time, both men were 24 years old and had recently

SPE/HGS Joint Luncheon Meeting continued on page 15

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struck out on their own as independent petroleum landmen. As native Oklahomans with third generation roots in the state, the two men operated an informal partnership from 1983-1989 based solely on a handshake. This small entrepreneurial enterprise was focused on generating oil and gas prospects for sale to industry partners and on participating as non-operators in the drilling of wells by others. About the time of their 30th birthdays in 1989, the partners decided to significantly expand the scope of their business and incorporated Chesapeake with an initial \$50,000 investment.

By 1998, McClendon and Ward were faced with the need to overhaul the company's strategy and asset base and to return to company roots in Oklahoma as Mid-Continent natural gas producers. Underpinning this move were two firmly held beliefs: first, that U.S. natural gas prices would significantly increase in value in the years ahead, and second, that the Mid-Continent was a region ripe for consolidation and for the application of leading-edge deep-drilling and natural gas exploration

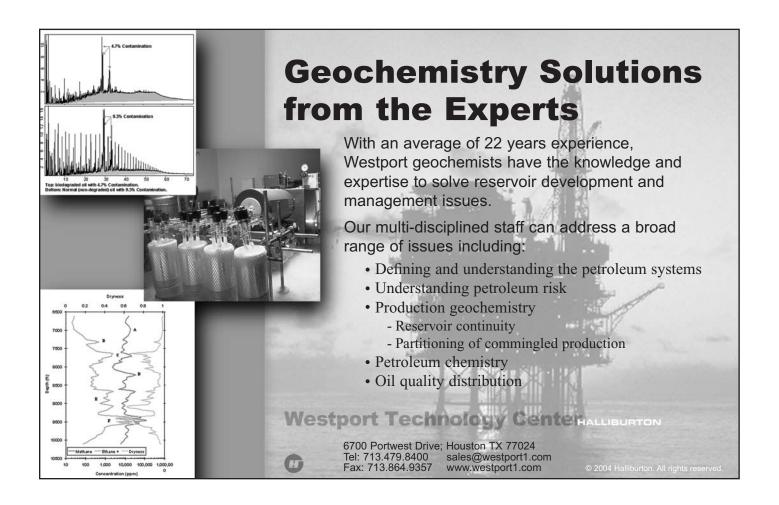
techniques. The success of Chesapeake's repositioning from 1998 though today is apparent in its growth to become the nation's third-largest independent natural gas producer.

#### **Biographical Sketch**

AUBREY K. McCLENDON has served as Chairman of the Board, Chief Executive Officer and Director of Chesapeake Energy Corporation since he co-founded the company with Tom L. Ward in 1989. Chesapeake Energy Corporation is one of the largest independent producers of natural gas in the United States, and the most active driller of new wells. Mr. McClendon graduated from



Duke University in 1981 and is now a member of the Board of Visitors of the Fuqua School of Business at Duke University.





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by **Steven H. Brachman**Pogo Producing Company
Houston, Texas

## Integration of 3D Seismic with Geological Knowledge Can Detect Non-Amplitude Combination Traps and Discover New Pay Zones in a 600-BCF Mature Play, Northern Lafourche Parish, Louisiana

Fifteen Middle and Lower Miocene reservoir sands have produced over 600 BCF equivalent from seven fields in the Thibodaux project area, northern Lafourche Parish, Louisiana (Figure 1). Traditional interpretations associated productive wells with classic Gulf Coast structural traps. On the basis of subsurface mapping, Pogo Producing Company's staff believed that opportunities existed for stratigraphic and combination traps in the Robulus L-age (Lower Miocene) sands and especially their uppermost member,

Prior to the 3-D, we were unable to determine what trapped Nicholls Sand production and what caused variations in sand distribution.

the Nicholls Sand. Our team determined that an unconformity played a major role in determining the location of Nicholls production in the Thibodaux project area. Further mapping revealed other areas where potential for similar traps existed. Subsequent drilling by Pogo and its partners resulted in the largest Nicholls sand discovery to date.

## Integrated Seismic and Geological Interpretation

The inability of 3-D seismic to help us identify the presence of either reservoir rock or hydrocarbon accumulations on the Thibodaux 3-D forced us to rely on our knowledge of the subsurface to help decipher HGS General Dinner Meeting continued on page 19



Figure 1: Location map of study area. Middle and Lower Miocene reservoir sands have produced over 600 BCFE from seven fields in the Thibodaux project area, northern Lafourche Parish, Louisiana.

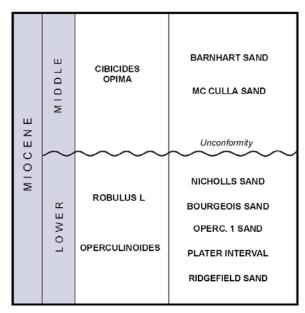


Figure 2: Thibodaux/Rousseau Southwest Lake Boeuf Area Stratigraphic column.

## The University of Texas at Austin Jackson School of Geosciences

The University of Texas at Austin's Jackson School of Geosciences is seeking to fill two positions for 3D Seismic Applications Specialists-one in the Dept of Geological Sciences and one in the UT Institute for Geophysics. These positions are part of a school-wide initiative to increase research and educational support for 3D seismic data applications in all units of the Jackson School of Geosciences.

Responsibilities for the position at the Institute for Geophysics, an organized research unit in the Jackson School of Geosciences, include managing and maintaining 3D seismic data sets, building processing flows, data editing and QC, building velocity models, running processing jobs on Sun servers and Linux clusters, and writing progress reports. The objective of this position is to support applications of 3D seismic reflection data to research projects addressing broader problems in understanding geologic and tectonic settings. In addition to supporting research efforts, candidates will be expected to develop their knowledge and skills of processing, and visualization software and provide instruction for other users. The ideal candidate will have a strong background in 3D seismic data processing, especially 3D depth imaging and use of Paradigm's Focus and Geodepth software.

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Responsibilities for the position in the Dept of Geological Sciences, the academic unit of the Jackson School of Geosciences, include management and support of seismic data sets for use by graduate student, staff and faculty researchers, management and support of 3D seismic interpretation applications software (including Landmark and GeoQuest), management and support of seismic processing systems (including ProMax and Omega) and support for parallel computing for imaging and inversion applications on very large clusters. The ideal candidate will have programming capabilities in Fortran, C/C++, MPI and open software applications.

Both positions require a Bachelors degree in an appropriate area of study and five years of relevant industry or academic experience. A MS degree is strongly preferred. The appointments will be 12 month salaried positions in the University of Texas at Austin Classified Staff category. Salary level is negotiable, and depends upon qualifications and experience. Funding is subject to renewal Sept. 1, 2007.

Please send a complete resume, written statement of interest in the positions and three reference to: Mr. George Mercado, The John A. and Katherine G. Jackson School of Geosciences, The University of Texas at Austin, P.O. Box B, University Station, Austin, TX 78713-8902. Applications may be submitted by email to: gmercado@mail.utexas.edu or on-line at http://www.utexas.edu/hr/empl/Review of applications will begin in August, 2005 and continue until the positions are filled.

For information on the school, visit www.geosci.utexas.edu

Background check will be conducted on applicants selected. The University of Texas at Austin is an Affirmative Actions / Equal Opportunity Employer. geologic relationships in the upper Robulus L sequence. We answered the question of discontinuous Nicholls Sand distribution by identifying the correlation on seismic between a single strong amplitude event and Nicholls Lime, the subsurface relationship between Nicholls Lime and Nicholls Sand and the impact of the Middle/Lower Miocene unconformity. We concluded that careful subsurface mapping with available well control would give us a better opportunity to make new discoveries in the Thibodaux project area than we would obtain by relying only on 3-D seismic data.

In 1998, Pogo's staff undertook a study of the project area using over 400 well logs and four regional 2-D seismic lines. One result of our subsurface work was the verification of a regionally extensive erosional unconformity at the Middle Miocene/Lower Miocene boundary. Immediately underlying the unconformity is the overpressured Robulus L sequence (Figure 2). The Robulus L consists of up to five individual sands, each of which may be productive. The sands may show internal variation and changes in thickness, but the overall distribution of each unit is widespread, except for the Nicholls Sand. More than 37 BCFG and 1.5 MMBO have been produced from the Nicholls Sand in the project area. It is the uppermost member of the Robulus L sequence and its distribution is locally variable and unpredictable. Reservoir thickness may range from 10 ft to 90 ft. An overlying unit of much higher resistivity, referred to as Nicholls Lime, is found associated with the Nicholls Sand in about 90% of occurrences. Lithologically, the Nicholls Lime either is a calcareous clastic unit, a calcareous bentonite, a limestone or a chalky lime (Figure 3).

In 2000, Pogo and its partners, Dominion Resources, Pennington O&G and Anschutz Exploration, helped underwrite the 74 square mile Thibodaux 3-D seismic survey acquired by Seitel, Inc. This was planned to better define the complex geology of the project area, understand the nature of producing reservoirs and accurately

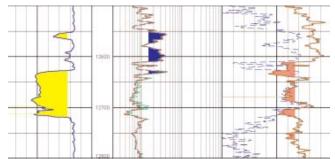


Figure 3: Well log of the Nicholls Sand (Robulus L). More than 37 BCFG and 1.5 MMBO have been produced from Nicholls Sand in the project area. The sand's distribution is locally variable and unpredictable.

locate untested conventional and unconventional traps. Prior to the 3-D, we were unable to determine what trapped Nicholls Sand production and what caused variations in sand distribution. Pogo and partners hoped to be able to isolate unique seismic attributes on the 3-D to help answer these questions.

Unfortunately, despite rigorous analysis of the 3-D data, the companies were not able to identify any seismic attributes associated with hydrocarbon-filled reservoirs or the presence/absence of sands in the overpressured section. Neither specially processed nor AVO volumes aided our effort. On the other hand, several continuous, highly positive amplitude events were observed in the 3-D volume. By incorporating subsurface information into the seismic data, we found that these highly positive events tied accurately to high-resistivity units throughout the Robulus L section, and they became our only lithology indicator. One particular amplitude event offered a reliable correlation with the Nicholls Lime. We mapped the high-amplitude event associated with the Nicholls Lime and used its positive correlation with the Nicholls Sand as an indirect indicator of reservoir. Areas where the event was absent were interpreted from subsurface and seismic evidence to have resulted from truncation by the Middle/Lower Miocene unconformity (Figure 4).

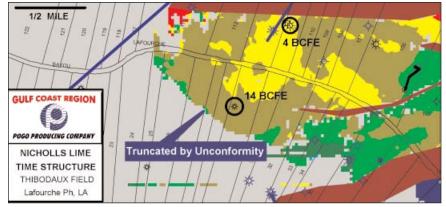


Figure 4: Time structure map on Nicholls Lime in Thibodaux Field. Note erosion of Nicholls facies to the southwest. Unconformity forms traps for Nicholls production in that portion of the field.

#### **Acknowledgments**

I would like to thank Pogo Producing Company for permission to publish this paper and Seitel, Inc. for permission to use its seismic data. I also thank our partners Dominion Resources, Pennington O&G and Anschutz Exploration for their technical input. This talk was scheduled for the 2005 GCAGS convention September 25, but the GCAGS convention was cancelled due to flooding in New Orleans.

HGS General Dinner Meeting continued on page 21

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#### **Biographical Sketch**

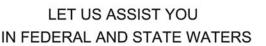
STEVEN BRACHMAN is division geologist for Pogo Producing Company. He is responsible for Pogo's activities in South Louisiana, including developing new exploration projects, evaluating third-party opportunities and supervising in-house prospect generation.

Steve has 24 years of experience, 18 in South Louisiana. He also has worked the mid-continent, Fort Worth basin, East Texas, Canada, offshore Gulf of Mexico and offshore California. Steve began his career in 1981 with Gulf Oil in Oklahoma City and was transferred to Kilgore, Texas, in 1983. He returned to Oklahoma City with SOHIO Petroleum in 1984 and was relocated to Houston the following year. Steve stayed with SOHIO/BP until 1990 and subsequently worked for Wintershall Energy, Araxas Exploration and Southwestern Energy and as an independent before joining Pogo in 1997.

Steve, a native of Chicago, Illinois, has a bachelor's degree in geology from Eastern Illinois University and a master's degree in geology from The Pennsylvania State University. He currently is president-elect of the HGS.



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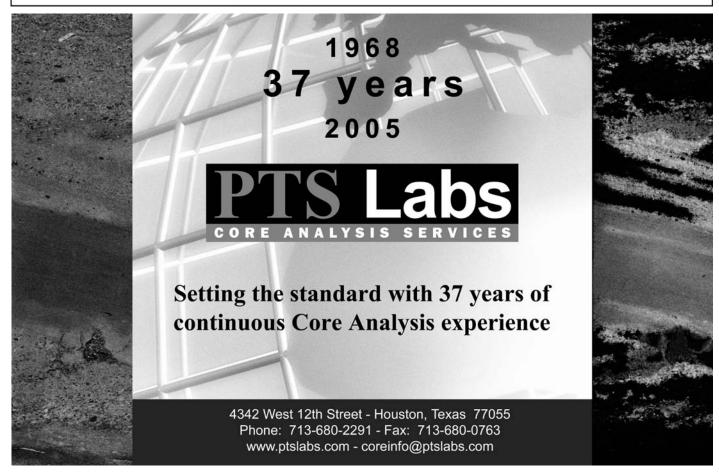
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#### by Ian Duncan

Associate Director for Environmental and Earth Systems Bureau of Economic Geology, Jackson School of Geosciences The University of Texas at Austin

## Developing a Carbon Sequestration Industry in the Gulf Coast

The extensive blankets of

low-permeability shales that

separate the sand aquifers

should assure storage for

thousands of years,

well past the expected age

of fossil fuel dominance.

#### **Abstract**

Although the causes, effects and remediation of global warming are still contested issues, there is a broadly held belief amongst climate scientists that carbon sequestration is the only viable solution to addressing what they see as the deleterious effects of carbon dioxide (CO<sub>2</sub>) buildup in the atmosphere. Carbon

sequestration involves the capture of CO<sub>2</sub> generated by the combustion of fossil fuels and placement of the carbon into long-term storage. (Power plants emit more than one-third of the global emissions of CO<sub>2</sub>.) One method of reducing atmospheric CO<sub>2</sub> concentrations would be the injection of CO<sub>2</sub> into the subsurface (geologic sequestration). The Gulf Coast Carbon Center envisions the Gulf Coast region becoming a major site, perhaps the nation's predominant site, for a new carbon sequestration industry. The economic engine that would power the development of this industry would be CO<sub>2</sub>-based

enhanced oil recovery. The Texas Bureau of Economic Geology has estimated that, excluding the Permian Basin, over 5.7 billion barrels of oil could be recovered in Texas by CO<sub>2</sub> EOR technology. This production could pay for the construction of CO<sub>2</sub> capture plants, regional CO<sub>2</sub> pipelines and compression facilities that later could be used for putting CO<sub>2</sub> into long-term storage in deep brine aquifers in the Gulf Coast. Chemical plants and fossil fuel gasification units currently being planned for the Gulf Coast area are potential sources of relatively cheap CO<sub>2</sub>. Input from environmental and petroleum geoscientists is needed to optimize the mechanics of CO<sub>2</sub> sequestration and also to help society to clearly understand both the risks and benefits of geologic sequestration.

#### Introduction

The increasing CO<sub>2</sub> concentration in the atmosphere is of global concern. The United States produces one-quarter of the world's

CO<sub>2</sub> emissions from the combustion of fossil fuels; therefore, it could play a critical role in capturing CO<sub>2</sub> and putting it into long-term storage. Unfortunately, the majority of these emissions are in the form of flue gas from coal-fired power plants that contains low CO<sub>2</sub> concentrations. These low concentrations result in high costs for the separation of CO<sub>2</sub> to enable long-term

sequestration. Gulf Coast chemical plants (such as hydrogen plants) are potential sources for high CO<sub>2</sub> emissions that may provide relatively cheap sources for CO<sub>2</sub>. Gasification of coal offers another way to cost-effectively decarbonize the energy from fossil fuels and thus facilitate carbon sequestration.

Current global levels of anthropogenic, or human-produced, CO<sub>2</sub> emissions are 25.6 gigatons of CO<sub>2</sub> per year. A significant portion of the global total, approximately 1 gigaton of these emissions, comes from the Gulf Coast region

of Texas, Louisiana and Mississippi, representing 16% of the U.S. annual CO<sub>2</sub> emissions from fossil fuels. The Gulf Coast region also provides an opportunity for addressing the problem: Geologic sequestration would enable fossil fuel to be decarbonized by capturing CO<sub>2</sub> from the combustion products and injecting the gas into a subsurface saline brine aquifer for long-term storage.

The Gulf Coast overlies an unusually thick clastic sequence comprising highly porous and permeable sand aquifers, separated by thick shale aquitards. This sedimentary wedge provides an amount of potential storage that is best described as vast and realistically available for hundreds of gigatons of storage. The extensive blankets of low-permeability shales that separate the sand aquifers should assure storage for thousands of years, well past the expected age of fossil fuel dominance.

**HGS Northsiders Luncheon Meeting** continued on page 25

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The Texas Bureau of Economic Geology (BEG) has formed the Gulf Coast Carbon Center (GCCC) to carry out applied research in developing strategies and protocols for long-term geologic storage of carbon in the deep subsurface of the Gulf Coast. The GCCC is a partnership between the BEG and a number of corporations, including BP, Chevron, Entergy, Kinder Morgan, Marathon, NRG, Praxair and Schlumberger.

The vision of the GCCC is to seek "to impact global levels of GHG (greenhouse gases) in the atmosphere by doing science and engineering studies that will support reduction of CO2 and methane emissions and enable the development of an economically viable, multifaceted,  $CO_2$  sequestration industry in the Gulf Coast."

#### Scenarios for Large-Scale Geologic Storage of ${\rm CO_2}$ in the Gulf Coast

Geologic storage in Gulf Coast brine aquifers, if implemented on a massive scale, could help reduce the rate of increase of CO2 during a transition period of a few decades while society effects a change to a hydrogen-based or some other energy future. This would require decarbonizing fossil fuels by retrofitting current power plants and factories with CO<sub>2</sub> scrubbers. This is capitalintensive (except in the rare cases where a pure CO<sub>2</sub> emission is produced) and is typically accompanied by a high energy penalty. For example, carbon scrubbers installed in a pulverized coal power plant may use 20% or more of the plant's power. The U.S. Department of Energy (DOE) is funding a range of research projects that seek to develop new carbon-capture technologies that would capture CO2 at significantly lower costs and with much smaller energy penalties.

Power plants based on the gasification of coal, called integrated gasification combined cycle (IGCC) plants, are evolving a "clean coal" technology that would provide a potential bridge to a future hydrogen-based economy. The DOE's proposed FutureGen plant is to be a state-of-the-art IGCC plant combined with CO<sub>2</sub> sequestration. The BEG is currently leading the Texas response to the DOE's competition to site the FutureGen plant.

The gasification of coal, lignite, petcoke and/or biomass is a process that can produce CO2 in much higher concentrations than can power plants using pulverized coal. Gasification plants use pure oxygen rather than air to partially oxidize coal in the presence of water at high temperatures and elevated pressures. Gasification of coal produces a syngas composed of hydrogen and CO<sub>2</sub>, with CO<sub>2</sub> in concentrations high enough to make traditional separation technologies cost-effective. This gas mixture is also suitable for separation using membrane techniques (an active field of research).

In addition to CO<sub>2</sub> capture, the necessary components of a future sequestration industry in the Gulf Coast include a regional pipeline system, distributed compression plants and the development of a variety of CO<sub>2</sub> sinks. Preliminary economic modeling supports the conclusion that regional pipeline complexes linking many sources and sinks are more efficient than single pipelines linking individual sources and sinks. Such regional pipelines also would allow matching capture and injection rates across multiple sites. The capital costs for adding capture to existing plants and building compressors and pipeline complexes are significant. It is likely that this industry will evolve by the development of a consortia of companies, each with expertise in some aspect of the new CO2 value chain.

#### CO<sub>2</sub>: A Potentially Valuable By-product from Chemical **Plants and Gasifiers**

In much of the United States, the market for CO2 is limited to food-grade CO<sub>2</sub> used for carbonated beverages and other food manufacturing. This is a relatively small-volume market with limited growth potential. CO<sub>2</sub>-flooding-based enhanced oil recovery (CO<sub>2</sub> EOR) is by far the largest existing CO<sub>2</sub> market and the only one that results in long-term storage of the CO<sub>2</sub>.

The Permian Basin is currently the largest commercial market for CO<sub>2</sub> in the world. The average price of CO<sub>2</sub> being sold from the pipeline network for EOR in the Permian Basin is not public information; however, prices are probably in the range of \$14 to \$17 per ton. The total market for CO<sub>2</sub> in the Permian Basin is estimated to have a value of about \$450 million annually.

Texas corporations and technical workers have a unique experience base in pipeline transport and subsurface injection of CO<sub>2</sub>. Since the early 1970s, CO<sub>2</sub> has been injected in several partiallydepleted Permian Basin oil reservoirs. Injected CO<sub>2</sub> is dominantly produced from natural accumulations in the Colorado Plateau and pipelined to the Permian Basin. About 10% has been derived from other sources such as gas plants that would otherwise have simply released the CO2 to the atmosphere. Currently roughly 30 MMt (million tonnes) CO<sub>2</sub> are injected annually in the Permian Basin in operations that are closed-cycle. In other words, CO2 that is produced from the reservoirs in association with the recovered oil is reinjected into the reservoir for additional recovery. As a result, a very large amount (on the order of 108 t) of CO<sub>2</sub> has accumulated in these reservoirs for storage.

Many individual EOR operations in the Permian Basin are at the scale of CO<sub>2</sub> production associated with coal-burning power plants. As an example, the SACROC unit near Snyder, Texas, currently injects ~13.5 MMt CO<sub>2</sub>/yr and withdraws/recycles  $\sim\!7~MMt~CO_2/yr,~$  HGS Northsiders Luncheon Meeting continued on page 57

### Environmental and Engineering Group

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**Dinner Meeting** 

by Christopher C. Mathewson Professor of Engineering Geology Department of Geology & Geophysics Texas A&M University, College Station, Texas

## What Should I Study Before I Take the Geoscientist Licensure Examination?

The licensed practice of geology incorporates those aspects of geology that are applied to the protection of the health, safety

and well-being of the public and that include careers in environmental geology, hydrogeology and engineering geology. Anyone desiring to follow a career in "Public Geology" and to practice before the public should obtain a broad academic background in geology, including quantitative physical geology, aqueous and low-temperature geochemistry, hydrogeology and contaminate transport, geomorphology and landform processes and most importantly, a sound background in field geology and geophysics.

The results of the
Task Analysis are used
to develop questions
for the licensure
examinations

geology before the public is uniform throughout the United States, thus validating the concept of one national examination.

The results of the Task Analysis are used to develop questions for the licensure examinations and to define the knowledge base required for a candidate wishing to practice professional geology before the public. Tasks are subdivided into domains that are then assigned examination weights based upon the results from the task analysis. The best coursework guide for a student wishing to practice environmental or engineering geology or hydrogeology is to review the ASBOG® Task

Analysis and the associated recommended knowledge base related to each content domain. The results of the 2005 Task Analysis and Knowledge Base evaluation will be presented and discussed.

Licensure of professionals who practice before the public is mandatory in those states that require professional geoscientists/ geologists to hold a license as a "Professional Geologist" before they can hold themselves out to the public as professionals. The National Association of State Boards of Geology (ASBOG®), an organization of State Boards of Licensing for Professional Geologists in the United States, prepares and administers the national geologist licensure examinations. ASBOG offers two examinations, the Fundamentals of Geology and the Practice of Geology, that are designed to measure minimum competency of a graduate immediately after graduation (Fundamentals) and after five years of practice (Practice). The examinations are developed by the Council of Examiners, with guidance from professional psychometricians, who provide critical guidance to the Council. The examinations are based upon a nationwide task analysis, in which licensed professional geologists are asked:

- to assess the importance of a specific task to the protection of the public and
- to estimate the amount of time that they spend on the specific task.

The 2005 Task Analysis had a nationwide reliability coefficient of 0.998 between states. These results indicate that the practice of

#### **Biographical Sketch**

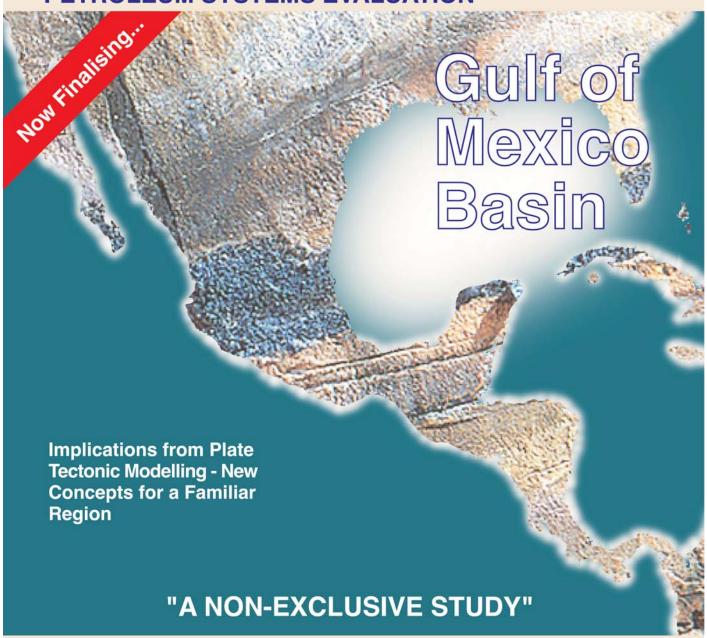
CHRISTOPHER C. MATHEWSON is a Professor of Engineering Geology at Texas A&M University, College Station, Texas. Professor Mathewson received a BS degree in civil engineering from the Case Institute of Technology in Cleveland, Ohio, in 1963 and his MS and Doctoral degrees in geological engineering from the University of Arizona in 1965 and 1971. Dr. Mathewson served as a com-



missioned officer in the National Ocean Survey from 1965 to 1970, working on ocean charting and marine geophysical surveys in the Pacific and on coastal hazards in Hawaii. In addition he has carried out research on coastal and river processes, expansive soils, urban planning, surficial processes, groundwater resources and protection, natural hazard analyses and mitigation, archaeological site preservation and engineering geology of surface lignite mines. He has presented over 400 papers, published over 90 technical Environmental and Engineering Meeting Continued on page 35

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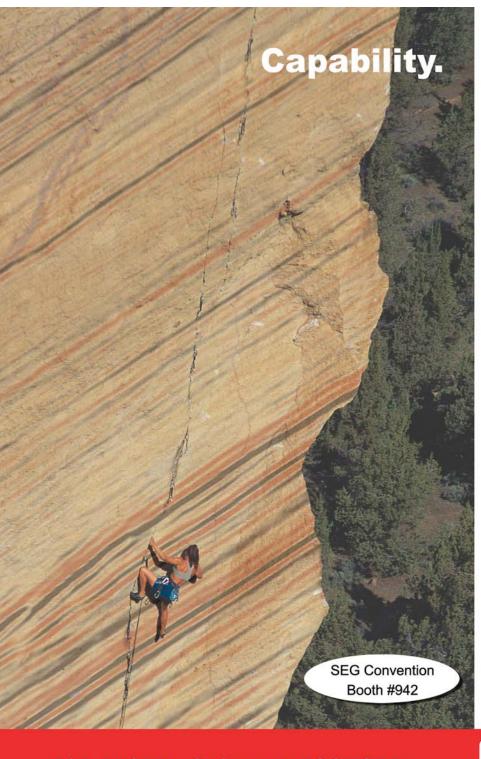
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## HGS-PESGB Africa Conference in Houston has Enthusiastic Attendance in September

By **Al Danforth**, co-chair of HGS International Explorationists Group

The 4th HGS-PESGB International Conference on African E&P completed another successful two-day event September 6-8 at the Marriott Houston Westchase hotel. This conference has become the primary technical meeting for anyone involved in exploration and production in Africa. Held annually, the conference is organized jointly by members of the HGS International Group and the Petroleum Exploration Society of Great Britain (PESGB). The



Africa Conference Committee: Richard Lovell, John Dombrowski, Gabor Tari, Steve Henry, Ian Poyntz, Ray Bate (PESGB) and Al Danforth.

presentations were a mix of important technical work selected from recent meetings around the world. About two-thirds of the presentations were oral and poster presentations never presented before. The September 2005 program featured 24 talks, 20 posters and 21 sponsor exhibits. Abstracts can be viewed on the HGS Website. Next year's Africa conference will be hosted by PESGB during September 2006 in London.

The aim of the yearly Africa Conference is to provide a venue for

exchanging ideas for exploration, the geology of the continent, application of emerging technologies and case histories of discoveries. The venue at the Marriott provided a great space for viewing the talks as well as the posters and technical exhibits of the sponsors during breaks, lunch and receptions and for mingling with old friends and new. The HGS International Group committee members who helped organize the program were Al

**HGS-PESGB Africa Conference** continued on page 30

Ian Poyntz and Al Danforth with a poster acknowledging contributions of the sponsors that provided good food and refreshments.





Posters were a site of lively discussions. Shown are Ken Nibbelink, Craig Scheifelbein, Bill Dickson and Don Rice.

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#### HGS-PESGB Africa Conference continued from page 29

Danforth, Steve Henry, Ian Poyntz, Richard Lovell, John Dombrowski and Gabor Tari. Ray Bate was a key liaison with the PESGB.

Highlights of the technical program included a series of regional papers. Two papers using animations of plate reconstructions by Davison and Scotese were included on the CD to attendees. Other regional views, most of which were well illustrated with seismic data, were provided on the Gabon-Congo-Angola margin (Buddin, Francis, Henry, Jacques, McAfee, Molnar, Pawlowski), equatorial Atlantic margin (Nemcok, Nibbelink, Richards, Smith), northwestern Africa (Coterill, Meaux), North Africa (Bevan, Bosworth, Fiduk), central Africa (Cornford, Lawrence, Reynolds) and eastern and southern Africa (Hyden, St. John, Pardon, Swart, Welch).

Another significant group of papers focused on the petroleum systems of Africa (Blacque, Cuthbertson, Dickson, Olson, McCormack, Rowell, Schiefelbein), and the characteristics of source rocks (Bray, Harris, Sabou, Zumberge). Examples at the reservoir scale and especially those from producing areas always provide good analogs, and these included examples from Algeria (Ball), Angola (Smithard) and the Niger Delta (McGee, Sahota, Sutton).

Thanks again to the Africa Conference sponsors for their support of a really great meeting.



*Great food at the receptions in the exhibit area!* 









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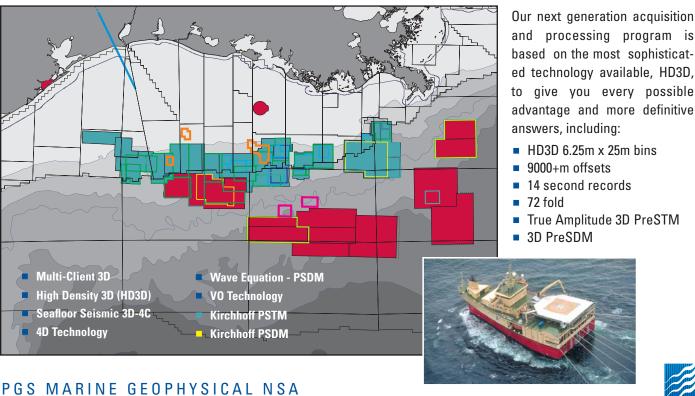


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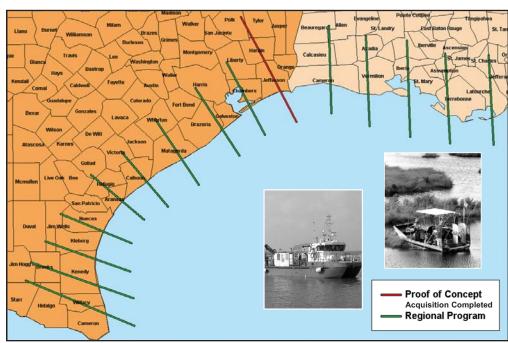
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## **November 2005**



Sunday

Monday

Tuesday

Wednesday

6 SEG Convention	Members Pre-registered Prices: General Dinner Meeting .\$25 Nonmembers walk-ups. \$33 Env. & Eng\$25 Luncheon Meeting .\$30 Nonmembers walk-ups. \$33 International Explorationists .\$25 North American Expl\$25 Emerging Technology .\$25	1 HGS Executive Board Meeting	9
13	14 HGS General Dinner Meeting by S.H. Brachman "Integration of 3D Seismic with Geological Knowledge Can Detect Non-Amplitude Combination Traps and Discover New Pay Zones in a 600-BCF Mature Play, Northern Lafourche Parish, Louisiana" Page 17	15 HGS Northsiders Luncheon Meeting "Developing a Carbon Sequestration Industry in the Gulf Coast" Page 23 HGS Engineering and Environmental Dinner Meeting "What Should I Study Before I Take the Geoscientist Licensure Examination?" Page 26	16
20	HGS International Dinner Meeting R.E. Sheriff Lecture by J.P. Bhattacharya "Martian River Deltas and the Origin of Life" Page 41	22	23
27	28	29	30

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3 HGS/ECH Conference "Coastal Subsidence, Sea Level and the Future of the Gulf Coast" Page 4	4	5
SPE/HGS Joint Luncheon Meeting by A. McClendon "Chesapeake's Thoughts on the Future of the U.S. Gas Industry" Page 13	11	12 Houston Gem and Mineral Society Field Trip Whiskey Bridge 281-530-0942 or field_trip@hgms.org
SIPES Luncheon Meeting by F. L. Oliver "Beware of Global Cooling" Page 37	18	19
Thanksgiving HGS office closed Thursday and Friday	25	26
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#### **Upcoming GeoEvents**

**December 4–7** 25TH Annual GCSSEPM Foundation Bob F. Perkins Research Conference *Page 52* 

Monday December 12 HGS Joint International/North American Dinner 2005 AAPG Meeting Matson Award —Best Paper A Compressional Origin for Minibasins Near the Sigsbee Escarpment, Gulf of Mexico

Friday December 16 HGA Christmas Luncheon

**Monday January 9**General Dinner Meeting
Geo-Legends

February 1-3 North American Prospect Expo George R. Brown Convention Center, Houston, TX

February 6-10 3rd Annual AAPG Winter Education Conference Hilton Houston Westchase Hotel Houston, TX Page 20

March 5-9 2006 APPEX London Page 47

April 9-12 2006 AAPG Annual Convention George R. Brown Convention Center, Houston, TX

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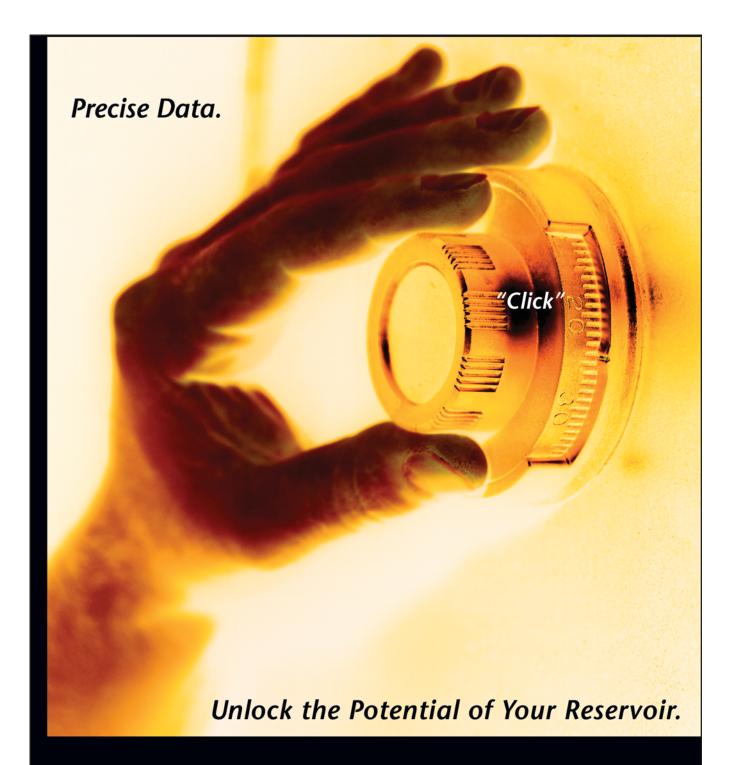
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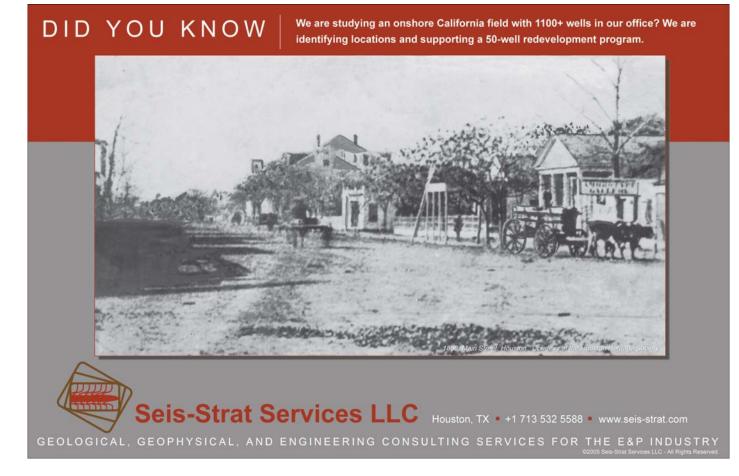
### **Environmental and Engineering Meeting** continued from page 26

papers, edited four technical volumes and is the author of a textbook in engineering geology.

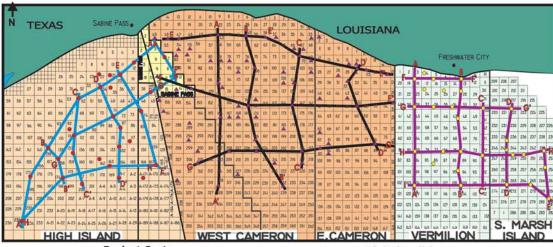
He is active in the profession, having served as President of the American Geological Institute, President of the Association of Engineering Geologists, Chairman of the Engineering Geology Division of the Geological Society of America, Chairman of the U.S. National Group of the International Association of Engineering Geology and the Environment, as well as many other society positions. He currently serves on the Council of

Examiners of the National Association of State Boards of Geology, where he assists in the writing and review of the national Geologist Licensure Examination. He has received many awards, including the Faculty Distinguished Achievement Award in Teaching from Texas A&M University, the Claire P. Holdredge Award and the Floyd T. Johnston Service Award from the Association of Engineering Geologists and the Meritorious Service Award from the Engineering Geology Division of the Geological Society of America.





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#### PROJECT DELIVERABLES

- Single well plots for each well with major mapable Genetic Sequences correlated with marker species, paleowater depth, well log and FAIRFIELD INDUSTRIES INC., Extracted 3-D PSTM seismic panels (one mile in length).
- Biostratigraphic and Sequence Stratigraphic tables for each well with marker species, paleowater depth, and age dated Maximum Flooding Surfaces (Seals).
- Cross Sections (Dip and Strike) annotated with age dated Maximum Flooding Surfaces and well logs.
- 4. Deliverables will be in two formats:
  - Hard copy binder (11"x 17") printed on premium paper and includes written report, single plots, etc.
  - Report and raw data is delivered in digital format.

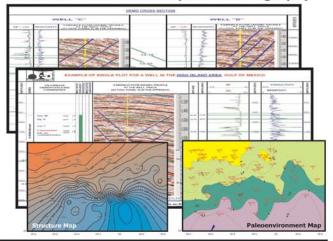
### Digital well-logs:

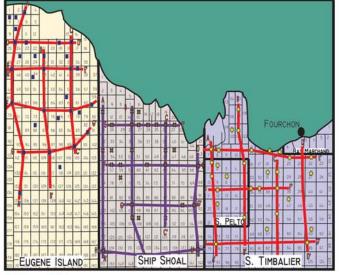
\$1,800 West-East Cameron (74 logs) \$900 High Island-Sabine Pass (30 logs) \$900 Vermilion-S. Marsh Island (30 logs) \$900 Eugene Island (30 logs) \$900 Ship Shoal (30 wells) \$900 S. Timbalier - S. Pelto (30 wells)

### PROJECT BENEFITS

- Understand the relationship between Genetic Sequences (in time), seals, potential reservoir sands and their paleowater depth, especially in the deeper Miocene section.
- Identify up to 12 Genetic Sequences that are associated with optimum producing and potential deep gas targets.
- Identify Maximum Flooding Surfaces (seals) on well-logs and 3-D seismic to provide local and regional timelines.
- Use MFS to construct, isopach, sand %, structural and biofacies maps.
- Assist in identifying the type of reservoir sands, play concepts and facies' relationships within each Sequence.
- Identify and correlate MFS with continuous reflectors on seismic panels in a 360 degree arc from each project well with the corresponding regional FAIRFIELD data set.

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**Luncheon Meeting** 

by Fred L. Oliver

# Social 11:30 a.m., Lunch 11:45 a.m.

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# Beware of Global Cooling

The current Holocene

warming period has lasted

for over 10,000 years.

ver the past several years the United Nations Intergovernmental Panel on Climate Change (UN-IPCC) has presented a significant amount of global climate data indi-

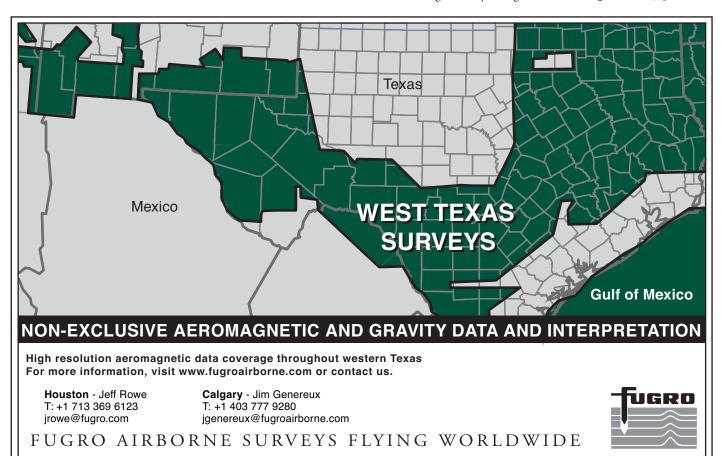
cating a prediction of catastrophic future increase in average global temperatures caused by an excessive influx of humangenerated carbon dioxide (CO2) from the burning of fossil fuels for the generation of human-required energy. For the most part, the UN scientific studies justifying such a

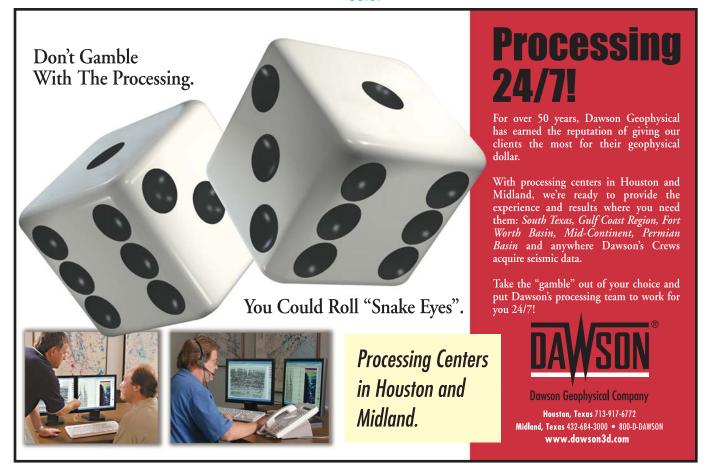
conclusion are based on global climate models (GCMs) with climate simulations from computer mathematical calculations and simulations. These studies have resulted in the UN-IPCC Kyoto Protocol calling for a treaty among all nations of the world to limit or reduce the amount of atmospheric CO2 by reducing the use of fossil fuels.

This may be an interesting scientific concept, but it comes at a time when there is no real current substitute for the generation of energy requirements from the burning of fossil fuels. It is not believed the

> global economy could afford such major investments in that removal and that the invention of unknown energy substitutes or alternatives seems far in the future. Nor could the growing global population afford to essentially go back to the horse and buggy days for many reasons. It is concluded that the experi-

ment would not be successful in reducing the rate of CO2 influx or in reducing the many natural causes for climate and temperature changes in any recognizable manner. If the experiment were successful, it would not be adequate to overcome the many natural geologic reasons for the perpetual climate changes demonstrated from the historical geologic record on all time scales. The global temperature would not be significantly changed. SIPES Meeting continued on page 39







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### **SIPES Meeting** continued from page 37

However, the form of global governments and their sovereignty, including that of the United States, could be substantially changed by such United Nations control. I do not believe the United States should agree with these possibilities and ratify the Kyoto Protocol even if it were proved that the limiting or removal of some small percentage of atmospheric  ${\rm CO}_2$  was possible and that it might have some effect on the average global temperature.

There are serious questions concerning the validity of the GCMs and their mathematical simulations because of the large number of natural causes for climate changes, many of them unknown or inadequately measured. The magnitude of the effects is unknown, as are the interrelationships of global changes with the attitude of the earth in relation to the sun.

A study of the paleo-geologic perspective of climate change indicated the current average global temperatures are well within the range of prior historical climates and temperature, in the past brought about by natural physical causes. The energy output from the sun has changed over geologic time. The physical surface of earth has changed, as has its attitude in relation to the radiant heat source from the sun.

This article will attempt to prove the paleo-geological relationship with the ever-changing global climate and the futility of attempting to change the climate by the removal of a small amount of  $\mathrm{CO}_2$  from the atmosphere.

There have been about 17 ice ages during the last 2 million years of the earth's history. In general, ice ages last about 100,000 years and interglacial global warming periods last about 10,000 to 14,000 years. The current Holocene warming period has lasted for over 10,000 years. What do you believe is coming next in the form of major climate change? There is good geological evidence for past climate changes and good evidence that the current warming period is one of the natural changes not caused by an anthropogenic increase of a small amount of CO<sub>2</sub> volume in the atmosphere. The percentage of change may be great, but the

amount of water vapor in the atmosphere has over 50 times more effect on global warming and it is also much more volatile.

Petroleum geologists, geophysicists and petroleum engineers need to help the population to understand the scientific physical reasons for climate change and protect the public from spending exorbitant amounts of money in attempts to prevent such natural changes.

### **Biographical Sketch**

FRED OLIVER is an independent petroleum geologist and petroleum engineer who actively pursues oil and gas prospects as well as production. He also claims on occasion to be semiretired. He was born in Amarillo, grew up in San Antonio, was graduated with degrees in physics and geology from the University of Texas at Austin and served as a Carrier Certified Pilot USNR during WW II.



Mr. Oliver's employment history includes time with Stanolind Oil & Gas Company, DeGolyer & MacNaughton, Inc, Oliver and West, Inc., and President of Greenbrier Operating Co. He is currently President of Petroleum Ventures of Texas, Inc. Mr. Oliver has published a variety of works, including an Annual Report of the Kansas Oil Scouts Association, and articles on the South Texas Wilcox Trend, Slocum Woodbine Field, East Texas Fairway Field, and Jeffress Field of Hidalgo County, Texas. He has also published a work on the "Classification of Petroleum Reservoir Traps" in The Production Handbook by McGraw Hill. He prefers to title his Scientific Perspective of Global Climate Change as "Beware of Global Cooling."

Fred is an active SIPES member who has held various offices in AAPG, SPE, TIPRO, SIPES and SPEE. He is an AAPG Trustee Associate and has recently been named Chairman of the Advisory Council, Jackson School of Geosciences at the University of Texas at Austin.

# Call for Candidates to the AAPG House of Delegates

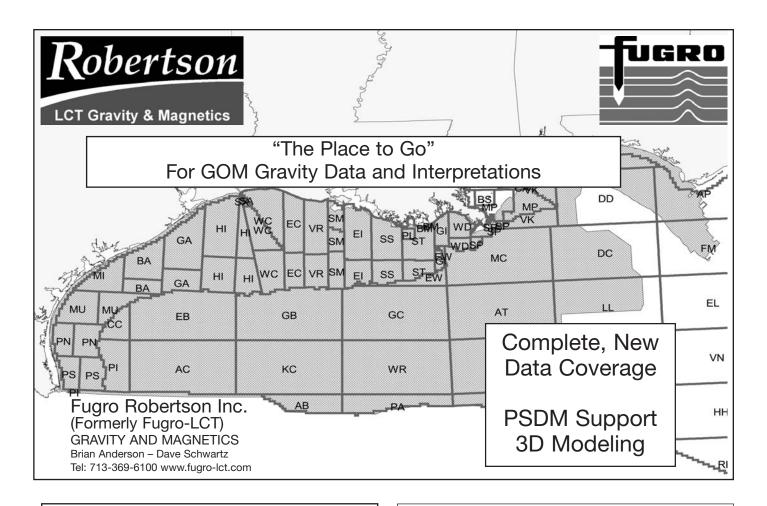
Houston candidates are now needed to run for the office of AAPG delegate in the election to be held in early 2006.

If you are interested in having a leadership role in the business and future course of AAPG by contributing your ideas and your voice toward AAPG's business agenda, consider running for Delegate. This service role offers opportunities for networking and making a meaningful impact on the continuing efforts of AAPG. If you would enjoy representing your colleagues to AAPG—and representing AAPG to your colleagues—this role is for you.

The House of Delegates is the legislative body of AAPG.

Delegates participate in the legislative process during the annual meeting of the entire House of Delegates at the AAPG Annual Convention. During their three-year term, Houston Delegates meet at monthly luncheons to network, process new member applications and manage the business issues at hand. The group is fun and energetic and many companies, geoscience roles and practices are represented.

New candidates with fresh ideas and viewpoints are welcome. If you are interested in running, please contact Steve Levine (steve.d.levine@conocophillips.com 281-293-3896) or Martha Lou Broussard (mlbrou@rice.edu 713-665-4428). ■



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# International Explorationists Dinner Meeting

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Westchase Hilton • 9999 Westheimer Poster Judging 4:30-5:30 p.m. Poster Viewing during Social Hour 5:30-6:30 p.m. Dinner 6:30 p.m.

Cost: \$25 Preregistered members; \$30 non-members & walk-ups

The HGS prefers that you make your reservations on-line through the HGS website at www.hgs.org. If you have no Internet access, you can e-mail reservations@hgs.org, or call the office at 713-463-9476. (include your name, e-mail address, meeting you are attending, phone number and membership ID#).

by Janok P. Bhattacharya Robert E. Sheriff Professor of Sequence Stratigraphy University of Houston Houston, Texas

### Robert E. Sheriff Lecture Series

Dr. John F. Casey will present an overview of current activities at UH. There will be posters and presentations on current thesis and dissertation research of UH graduate students. Page 44-45

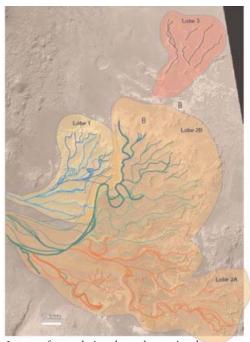
# Martian River Deltas and the Origin of Life

There remains significant room for  $oldsymbol{1}$  debate as to whether there were persistent water flows, significant precipitation and standing water bodies during the early Noachian history of Mars. Recent Mars Global Surveyor (MGS) Mars Orbiter Camera (MOC) images of meandering channels associated with a Noachian-age, lacustrine delta within Holden NE Crater show evidence for persistent water flows.

The topmost layer shows clear evidence of meandering streams associated with four depositional lobes. The channels record a complex history of migration, avulsion and bifurcation, forming a distributive pattern with up to five orders of branching. Several channels show a distinct transition from initially straight, to highly sinuous, followed by classic chute cutoffs.

Relatively smooth and more brightly reflective layers deeper in the crater fill may represent flatter-lying lacustrine bottom sets and could speculatively be evaporitic. The transition from smooth lower layers lacking channel belts to straight channels to meandering channels suggests a progressive evolution of the sedimentary fill.

Our analysis of the surface features, as well as estimates of accumulation rates of the underlying 150 meters of strata within the crater fill, suggests that Holden NE Crater may have contained a



Images of meandering channels associated with a lacustrine delta show evidence for persistent water flows.

a PhD in 1989 from McMaster University, Hamilton, Ontario, Canada. Following a Natural Sciences and Engineering Research Council post-doc at the Alberta Geological Survey in Edmonton, Janok worked for the Bureau of Economic Geology at Austin, ARCO Research in Plano, Texas, and the University of Texas at Dallas before joining UH. He is an

lake that persisted for a few thousand to possibly as long as a few million years. This supports the hypothesis that early Mars was both warmer and wetter during the Noachian. In addition, these sediments represent a probable watery habitat that should be investigated for evidence of possible extinct Martian life.

### **Biographical Sketch**

Dr. Janok P. Bhattacharya is the Robert E. Sheriff Professor of Sequence Stratigraphy at the University of Houston. His research interests include deltaic sedimentology and sequence stratigraphy, the local control of structure on stratigraphy and reservoir architecture of clastic depositional systems. He received his BS in 1981 from Memorial University of Newfoundland,

International Meeting continued on page 43

Canada, and

Student Posters — R.E. Sheriff Lecture	
Tier I: New Graduate Students	Author
Application of Ground Penetrating Radar, Remote Sensing and Oxygen Isotopes for Shallow Reservoir	Damayanti Mukherjee
Studies in Central Texas	Damayanti Wukiterjee
Geochemistry and Provenance of the Parras Shale and Difunta Group of Northeast Mexico	Angelica Trujillo
Philosophy and Science: Aristotle's versus Hegel's Logic in Geosciences	Aleksandar Jeremic
Stable Wavefield Extrapolation using Recursive Operators	Thang Nguyen
Estimating and Interpreting the Instantaneous Frequency with Continuous Wavelet Transform	Shenghong Tai
Wavefield Extrapolation Operator	Thang Nguyen
Attribute-assisted Interpretation of Teapot Dome, Wyoming	Dragan Lazarevic
Structural Interpretation of Seismic Attributes Tying by well Log	Qifeng Dou
Image Processing of 3-D Attribute Volumes	Rafael Sanguinetti
Tier II: Experienced Graduate Students	Author
Remote Detection and Geochemical Studies for Finding Hydrocarbon-Induced Alterations in Lisbon Valley, Utah	
Mapping Alterations Caused by Hydrocarbon Microseepages in the Patrick Draw Area of Southwest	Sarah Jacobson
Wyoming, Using Image Spectroscopy and Hyperspectral Remote Sensing	
Improving Vertical and Lateral Resolution by Stretch-Free, Horizon-Oriented Imaging	Gabriel Perez
Microbially Induced Stabilization of Siliciclastic Sediments	Sushanta Bose
Identifying Subsurface Stratigraphy and Source Vents with AIRSAR and Ground Penetrating Radar in	Jaime Fernadnez
Craters of the Moon National Monument,	
Predicting Water Saturation: Fizz Vs. Gas	Jennny Zhou
Detachment and the Extent of Shortening Across the Parras Basin, Coahuila, Mexico.	Kamaran Zahid
Nature of the Spinel Phase in Ordinary Chondrites	Rachel Sissenwein
Bed Thickness Calculation from Spectral Decomposition Compared with Neural Network Log Properties	Charles Puryear
Prediction	T' 01
Mapping Active Faults from Space: Case Study from Kalabagh, NW Himalayas	Lize Chen
Structural Evolution of the Central Sierra Madre Orienatal Fold-Thrust Belt, Mexico: Role of Pre-Existing Basement Structures in Fold-Thrust Belt Development	Ali Hamade
Mapping Geology and Structure Using Multispectral and Hyperspectral Data and Evaluating Topographic	
Correction Methods: Case Study, Salmon River Mountains of East-Central Idaho	
Oil Provenance of the Central Basin Platform, West Texas	Jeffery Jankoski
Effect of Boutique Seismic Processing on Geometric Attributes	Joel Anthony Famini
Scattering Attenuation Effect on Acoustic Impedance Inversion	Xingang Chi
Pore Shape Effects on Seismic Properties of Carbonate Rocks	Mritunjay Kumar
Gravity Study of the Ocean Continent Transition (West Africa)	Diana Dragoi-Stavar
Geochemical Distinction of Valley Fill Sandstones from the Mannville Group and Basal Colorado	Milly Wright
Sandstone, Lower Cretaceous, Southern Alberta	/
Inversion of LARSE data using Deformable Layer Tomography	Chris Gantela
AVO Prediction for a Dipping Thin Bed	Hongmei Cao
Whole Rock Trace Element Geochemistry of Metamorphic Sole Metabasalts and Lavas and Sheeted Dikes	Jian Huang
from the Bay of Islans Ophiolite in Western Newfoundland	
Scattering Effect on Acoustic Impedance Inversion	Xiangang Chi
Turning Effect on Fluid Properties Estimated from AVO Inversion	Maria Rojas
AVO Analysis for a Well from GOM	Haitao Ren
AVO Response for a Dipping Thin Bed	Hongmei Cao
Physical Modeling of Anisotropic Media	Byron Golden
<u>Tomostatics</u>	Nebojsa Pralica
Tier III: Experienced PhD Students	Author
Testing for an Absence of Regional Shortening (or Extension) Across the Caribbean-South America	Armando Altamira
Plate Boundary Zone	
Gravitational Gliding of the Sierra Madre Oriental Fold-Thrust Belt, Central Mexico	Yong Zhou,
Instantaneous Spectral Attributes to Predict Reservoir Properties	Jianlei Liu
The Characteristics and Genesis of Quaternary Pedogenic Caliche Nodules in Mission Bay, Texas	Jie Zhou
Seismic Wide-Angle Processing to Avoid Stretch.	Connie VanSchuyver
Origin of Cyclic, Finely Laminated Mixed Carbonate and Siliciclastic Strata in a Middle Jurrassic Lagoon,	James L. Strasen
Bighorn Basin, Wyoming  Description of Continued Managin Fields Associated Transferred Tra	Nt. 1. D 1.1.
Properties of Gravity and Magnetic Fields Across the Continental Transform Zone: Implications for	Neda Bundalo
the Deep Structure and Evolution of the San Andreas Fault in Southern California  Cravity Study of the Ocean Continent Transition (West Africa)	Diana Dragai Ct
Gravity Study of the Ocean Continent Transition (West Africa)  Microbially Mediated Dolomits in the Green Piver Formation	Diana Dragoi-Stavar Long Ma
Microbially Mediated Dolomite in the Green River Formation Geochemical Investigation of Origin of the Frio-Reservoired Oil from Brazoria County, Texas	Hao Guo
Crustal Velocity Structure Study from the Los Angeles Basin to the Mojave Desert, Southern California	Li Li
Fault Systems in the Northern Fort Worth Basin	Hao Guo
Physical Modeling of Channel Systems	Julius Doruelo
1 nysical modelling of Chairmer systems	junus Dorucio

AAPG Southwest Section Distinguished Educator and AAPG Distinguished Lecturer and was Technical Program Chairman for the 2004 AAPG Annual meeting in Dallas. He has authored over 100 abstracts and 40 technical papers.

### **Robert E. Sheriff Lecture Series**

The lecture series is sponsored by the University of Houston Department of Geosciences and UH Geoscience Alumni Association in association with the Houston Geological Society International Group.

The current president of the University of Houston Geoscience Alumni Association (UHGAA) will serve as Master of Ceremonies. Dr. John F. Casey, Department of Geosciences Chairman, will present an overview of current activities at UH. There will be posters and presentations on current thesis and dissertation research of UH graduate students. Volunteers from the professional geoscience community judge student posters.

The Robert E. Sheriff Lecture Series was initiated in 1999 by the

UHGAA. For the past several years it has been co-sponsored by the International Explorationists Group of the Houston Geological Society. The series honors Dr. Sheriff as an educator, scholar and

Come and meet the next generation of geoscientists from UH!

proponent for the geosciences. Its mission is to

- Bring some of the best known geologists and geophysicists in the world to the Houston community in order to share ideas relevant to exploration geology and geophysics and
- Showcase geoscience activity at the University of Houston.

### **Geological Data Library is offering dues-free membership**

Geological Data Library, Houston's premier archive of donated and acquired logs, is offering dues-free membership to displaced geo-professionals through the end of 2005. Check out www.geologicaldata.com, call Sue Campos at 713-659-0055 or visit their downtown facilities at 811 Dallas, Suite 930, Houston, Texas 77002 (Americana Building). Services include SMT (Kingdom) workstations, 36" scanner, Tobin lease and base maps, production data, etc.

# **East Texas Geological Society** Call for Papers The Gulf Coast Mesozoic Sandstone Gas Province

November 16, 2006 • Tyler, Texas • Harvey Hall Convention Center

The East Texas Geological Society is sponsoring a symposium on the geology, reservoir characteristics and petrophysical character of the Cotton Valley, Bossier, Travis Peak (Hosston), Woodbine and other gas-producing formations in the Gulf Coast Mesozoic. The area of interest includes East Texas, North Louisiana and Mississippi. The Society is actively seeking authors who would like to present their work to an audience of industry professionals involved in the exploration and production of petroleum. The proceedings of the symposium will be published as a volume of papers and distributed to the symposium participants and attendees.

The presentations should be designed to last about 25 minutes, and the publication guidelines are those used by the Gulf Coast Association of Geological Societies. Please submit a title and a brief description of the theme of the presentation to the East Texas Geological Society by November 15, 2005. Both hard copy and on-line submissions are acceptable.

Contact information: Rick Turner, Vice President, East Texas Geological Society

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100 E. Ferguson, Ste. 712, Tyler, Texas 75702

rick-bsr@tyler.net 903-593-5221

All submittals are welcome. Questions should be directed to Rick Turner. The East Texas Geological Society looks forward to your participation in this informative and enjoyable event.

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# Member News

LISA ASHABRANNER has joined Shell International E&P as a Geologist with the Geohazards Assessment Team effective August 16, 2005. She was formely a Consulting Geologist with Digital Prospectors and a Geologist with Phillips Petroleum.

MICHAEL S. BENRUD, Chief Geologist at South Bay Resources, L.L.C. is the new HGS Directory Committee Chairman.



Jon Blickwede accepts the award for HGS Best Paper (2004–2005) for his talk on Unocal's deepwater Trident discovery from Mike Deming, HGS awards chairman.

# The AWG in Houston has announced the results of their recent elections:

President: Sonia Bradley, new to ExxonMobil from Univ. of Oklahoma

Vice President: Julie Trotta, new to GeoMechanics, Inc. from Brown Univ.

Secretary: Julie Matoush, ExxonMobil employee Secretary Alt: Heather Quevado, ExxonMobil employee Treasurers: Jan Boyer, retired ExxonMobil employee, now Yoga Instructor / Deb Weeden, ExxonMobil employee,

AWG Foundation Board member



New Orleans Geological Society President Bret Hampton (Shell) meets HGS President Dave Rensink (Apache) at the HGS September 12 Dinner Meeting. Bret had to relocate to Houston temporarily as a result of Hurricane Katrina, while downtown New Orleans is shut down.

# HGS Hurricane Katrina/Rita Assistance Program

by the HGS Community Outreach Committee

The HGS solicits immediate participation from all HGS members! There will be a Sign-Up Table adjacent to the registration table during the upcoming lunch and dinner meetings. YOU CAN HELP.

### **Open Your Checkbooks!**

HGS will continue to accept financial contributions to assist the American Red Cross, Houston Food Bank and the Salvation Army.

### **Open Your PDAs and Daytimers!**

HGS is recruiting members in order to build a database of volunteers for Hurricane Katrina Related Assistance. Over the next several months HGS, as an organization, will sponsor some of the following:

- Clothing Drive/Clothes Sorting half day or full day
- · Houston Food Bank half day or full day
- Assisting the American Red Cross Effort wherever our help is needed

### **Open Your Homes and Offices!**

We are developing *free temporary housing* for displaced individuals and families who are HGS members, AAPG members or members of the New Orleans Geological and Geophysical Societies from

the affected areas. If you are willing to share your home or a vacation home with a displaced individual or family, please contact a member of the HGS Community Outreach Committee listed.

We are also developing *free temporary office space* for small companies and independents so they may continue their operations. If you are willing to share your office or know of some one who may be willing to share extra office space, please contact a member of the HGS Community Outreach Committee.

To help on the committee, and/or to volunteer, contact the HGS office directly at 713-463-9476, go to the HGS Community Outreach Committee Website Link or contact any of the individuals listed below.

Walter Light 713-823-8288 wthunderx@aol.com Cindy Gillespie 832-969-4385 clgillespie@sprintpcs.net Paul Babcock 713-859-0316 pbabcock@pecorp.com

Steve Levine 281-293-3896

steve.d.levine@conocophillips.com

Dave Rensink 713-296-6332 dave.rensink@apachecorp.com

Displaced HGS members—remember to update your contact info online at hgs.org. Please send any contact info or announcements you wish to have published in the *Bulletin* to editor@hgs.org.

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# Chairfest 2005

by Paul Britt

Summer is a break in HGS activities, but not in operations. The newly elected Board and the committees are preparing the next year's agenda and budget. Committee chairmen are organizing their committees and looking for new committee members. And in all of this there are a lot of new faces. Chairfest is held each year so that the Board members and committee chairmen can meet, discuss plans and get to know each other.

This year's Chairfest was held at the Hunan Restaurant on Post Oak on Thursday, September 15 and hosted by President Dave Rensink. The event was well attended, and most of the Board and committees were

represented. Upcoming events were announced and HGS operations and procedures were presented. The technical program chairmen were present, and we should have an outstanding series of lunch and dinner talks for all interests.

Charles Sternbach was in attendance as AAPG Convention General Chairman. The convention will be held in Houston next year, April 9-12, 2006. ■



Susan Black, HGS Secretary



Linda Sternbach, HGS Vice President





Ken Nemeth, HGS Treasurer







# NEW !! Field Seminar

### Paleocene Mass Transport Complexes

<u>What:</u> A 4-day field seminar to study outcrops of slumps, debris flows, and thin-bedded turbidites of the Paleocene Chicontepec Formation.

Where: Tampico area, northeast Mexico

Who: Any geoscientist or engineer working the deepwater GoM, shallow hazard surveys or Multiple Service Contracts with Pemex.

When: On demand.

# White Paper

### Thin-Bedded Turbidite Levee Reservoirs

What: Comprehensive report of nine producing fields. Sections include: Architectural Elements, Recognition Criteria, Depositional Models, Well Design, Production Characteristics and History, and Reservoir Model. Also includes: Logs, Monthly Production Profiles, and a Summary Poster. Who: Any geoscientist or engineer exploring for, or developing thin-bedded reservoirs.

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# **HGS GOLF TOURNAMENT RESULTS**

# Kingwood Country Club-September 19, 2005

		oy Allun Fil	ipov		
<b>Marsh Golf Course</b>		<b>Island Golf Cours</b>	е	<b>Lake Golf Course</b>	
<b>1st Flight 1st</b> Rob Dammer, Ken Silver, Brad Jones, Wayne Camp	Score 58	<b>1st Flight</b> 1st Sonny Landrum, Jesse Marion, L.B. Roemer	Score 59	1st Flight 1st Duane Halverson, Don Rundle, Epps, Carter Enlow	Score 57
<b>2nd</b> Joey Mustacchia, Dixon Millican, Ken Beeney, Scott Opdyke	59	<b>2nd</b> Joe Dryer, Matthew Tyrell, Lance Sims, Dave Mitchell	62	<b>2nd</b> Gary Wagner, Roger Bohanan, Paul Beale, Buddy Murah	59
<b>3rd</b> KC Weiner, Gene Coates, Jon Norman, Ken Weisenberger	60	<b>3rd</b> Elbert Johnson, Pat Donais, Art Gray, Michael Gray	62	<b>3rd</b> Mark Ohnoutka, Mark Roseland	61
2nd Flight 1st Herb Martin, Russ Somers, David Doughtie, Jay Setlock	Score 64	<b>2nd Flight 1st</b> George Lauhoff, Jeff Sabo, Kevin Talley, Carl Comestock	Score 64	<b>2nd Flight</b> 1st Mark Edwards, Mike Walker, Chriss Tutt, Pat Klem	Score 64
<b>2nd</b> Charles Siebels, Robert Fox, Jeff Dunleavy, David Mann	64	<b>2nd</b> Noel Daly, Jerry Mazzaferro, Buck Thrailkill, John Morgan	64	<b>2nd</b> Ernest Furman, Walter Knowles, Brown	64
<b>3rd</b> Karen Sontag, Steve Stoutamire, Russell Jones, Paul Cullen	65	<b>3rd</b> Frank Rodriguez, Craig Steiner, Tim Dore, Jason Dore	65	<b>3rd</b> Mike Bertness, Walt Denny, Russ Andress, Brian Key	65
3rd Flight	Score	3rd Flight	Score	3rd Flight	Score
1st Pete Dotsey, Gil Depaul. Keith Pope, Randy Herbert	68	1st Scott Layne, Andrew Mehlhop, Bill Troxil, Clive Hurst	68	1st Kip Ferguson, Randy Besh, Powell Ytsma, Vin White	68
<b>2nd</b> Sharon Courtney, Adrian McGrail, Chris Willacy, Charlie Hughes	68	<b>2nd</b> Steve Anna, Bob Unger, Susan James, Dave Keck	69	<b>2nd</b> Chuck Ward, Mike Balombin, Dennis Clark	68
<b>3rd</b> Rob Mayer, Don Marlin, Leon Lew, Tony Welka	68	<b>3rd</b> Norm Stager, Mike Scherrer, Scott McDonoough, Tamra Beauboeuf	70	<b>3rd</b> Bruce Farmer, Rick Johnson, Dave, Bob	69
4th Flight 1st Kevin Ferrin, Kank Phalzer. Barry Newman, Tony Barnes	<b>Score</b> 72	4th Flight 1st Susan Hudson, Tom Rousch, Bob Ramsey, Gail Bryan	<b>Score</b> 73	4th Flight 1st Scott Eberhardt, Zoila Cedeno, Mark Taylor, Kevin Anderegg	<b>Score</b> 71
2nd Mike Naughton, Paul Babcock, Gary Squyres, Larry Parrish	72	2nd Sudha Sudhakar, Gary Sorensen, Wendi Tibiletti, Gary Carver	73	2nd Dorothy Swanson, Phil Duda, Amy Vanderhill	71
3rd Michele Pou, Mike Hebert, Danny Addis, Mike Sweigart	74	<b>3rd</b> Richard Grant, Phil Trumbley, Greg Johngarlo, Matt Maczygembe	74	<b>3rd</b> Ron Symecko, Chuck Hauf, Jack Downing, John Hamilton	72

# HGS Golf Tournament Kingwood Country Club-September 19, 2005

The 2005 Houston Geological Society golf tournament was held on Monday, September 19 at Kingwood Country Club. Over 420 participants survived the hot weather and enjoyed the excellent support of the volunteers.

The tournament would not be have been a success without the work done by Lilly and Joan, your HGS office staff, the tournament volunteers, the sponsors and the Kingwood Country Club staff.

As usual, the sponsor signs were created and donated by Thomas Reprographics.

Some of the participants could not make it to the event and asked that their fees be donated to hurricane victims.

Gareth Taylor—Rock Solid Images Phil Conway—GeoKnowledge

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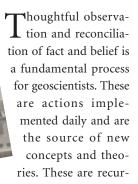
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# Book Review George O. Chandlee Source Environmental Sciences, Inc.

Repcheck, J., *The Man Who Found Time: James Hutton and the Discovery of the Earth's Antiquity*, 247 pages, Perseus Publishing, \$26.00.



ring themes throughout the history of

geological science. As Jack Repchek points out in his book *The Man Who Found Time: James Hutton and the Discovery of the Earth's Antiquity*, such is the case for the 18th-century Scottish gentleman farmer and natural philosopher James Hutton.

AMES HUTTON

JACK REPCHECK

Hutton studied his land, tended to his farm, observed the subtle and slow changes in the land and developed a novel conclusion: changes in the earth, erosion, topographical changes and the like that he observed could not be attributed to one cataclysmic flood 6,000 years ago, as was taught by the Church. More likely, it appeared that the forces of volcanoes, earthquakes, wind and rain could have sufficed to produce the landscape. These are slow-acting forces, however. Therefore, the missing factor must be "deep and immense time"; time so deep that these forces would have ample opportunity to produce an observable impact. In 1788, Hutton formally presented proof that the earth was much older than the 6,000 or so years being taught by the Church. In fact, its age was incalculable and could conceivably be tens or hundreds of millions of years old.

Copernicus, Galileo and Darwin are frequently regarded as key figures in the emancipation of science from the binding dogma of religious orthodoxy. But James Hutton should be included among them as a pioneering observer. Biblical scholars had persistently "demonstrated" for centuries that the first day of Creation occurred in approximately 4000 BC. In fact, biblical chronology, as the discipline of precise biblical dating was called, was one of the most rigorous "sciences" of the pre-Renaissance era. Many recognized figures from church history, including the prophet Elijah, St. Augustine, St. Bede, St. Thomas Aquinas and even Martin Luther had commented on the age of the earth.

Hutton's insight laid the foundations of modern geology and provided a necessary framework for the theory of evolution. In *The Man Who Found Time*, Repcheck argues that Hutton deserves recognition similar to Copernicus, Galileo and Darwin for helping to separate science from theology. In this book,

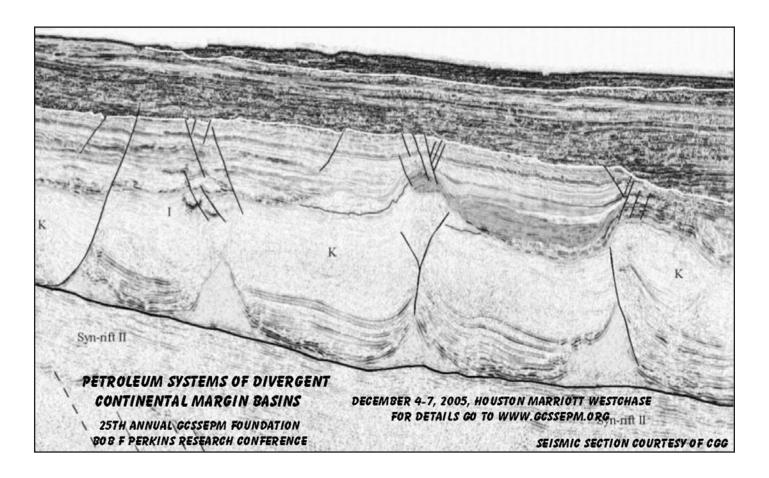
Repchek touches on biblical chronology, the Scottish Prince "Bonnie Prince Charlie" and the Scottish Enlightenment. He paints a portrait of a gifted if enigmatic man who insisted on accepting the face value of his observations.

Hutton's discovery was important at its time because no other scientist argued against the chronology set out by the Bible. In fact, scientists made their observations fit into the Bible's timeline. In a way, Hutton's theory contradicted prevailing orthodoxy more than the theories of Copernicus, Galileo or Darwin: Copernicus made the sun, not the Earth, the center of the universe; Galileo challenged ideas about the structure of the solar system; and Darwin shed light on the origins of man. Hutton's research and claims neutralized the Biblical chronology of Earth's history and completely changed our concept of the history of the planet. Hutton deduced that, in terms of man's presence, the Earth practically has no beginning or end.

Very little information is available about Hutton's personal life, but Repcheck does a first-class job of providing insights about his life and times. As background information, Repchek digresses in several directions. For example, Repcheck gives an excellent and fascinating history of biblical chronology and discusses in detail the Scottish Enlightenment in which Hutton participated. There is also an interesting account of Scottish history during Hutton's lifetime and the period preceding it, including the rebellion led by Bonnie Prince Charlie.

Hutton was a contemporary of powerful and well-recognized members of the Scottish Enlightenment, such as David Hume, Adam Smith and James Watt. However, Hutton's 1795 book, *The Theory of the Earth*, was so long, obscure and poorly written that it nearly fell into obscurity. Charles Lyell rescued and promoted Hutton's ideas. James Hutton's work set the stage for geologist Charles Lyell and the early geologists, who would use and verify Hutton's ideas. Unfortunately, Hutton was soon forgotten in the annals of history, mainly because his only published major work was so academic and indecipherable that it was largely ignored.

The Man Who Found Time is full of interesting information, a significant portion of which is devoted to discussing the history of the Church and the Scottish Enlightenment, as well as details of Hutton's life. This book will be of interest to geologists because it provides a perspective into the life of Hutton, the man known as the "father of deep time." Repcheck does an excellent job in establishing and returning the credit due Hutton. Geoscientists will find the book engaging and full of information concerning the times and personality of Hutton.



# Show off Your Artistic Ability 4th Annual HGS Photo & Graphic Art Contest

- Selected entries to appear on the cover of the HGS Bulletin
  - All Entries to be displayed at a HGS General Meeting!

Show off our artistic ability by participating in the 4th Annual HGS Graphic Arts Contest! Submit your best photographs, hand-drawn art or computer-generated graphics, and see them appear on the cover of the HGS *Bulletin*.

### **IUDGING CRITERIA**

Subject Matter

· Geological Interest

· Quality of Art

- Industrial Interest
- Suitability for Publication on the HGS Bulletin Cover

All Entries Must Be Received By December 1, 2005. Send entries to the HGS office. All entries imply permission to publish.

# Government Update by Henry M. Wise, P.G. and Arlin Howles, P.G.

### **Texas Railroad Commission News**

The Texas Railroad Commission has issued a Notice to Operators describing 2005 legislation that will affect them:

- HB 380 Well-Specific Plugging Insurance Policies (effective June 17, 2005)
- HB 484 Filing of Electric Logs with the Commission (effective September 1, 2005)
- HB 2161 Orphaned Well Reduction, Low-Producing Well Tax Reduction and Enhanced Efficiency Equipment (effective January 1, 2006)
- HB 2201 Clean Coal Projects (effective September 1, 2005)
- SB 1130 Reporting of Petroleum Hydrocarbon Contamination by Pipeline Owners/Operators (effective September 1, 2005)

To see the entire document go to http://www.rrc.state.tx.us/divisions/og/notices-pubs-swr/notices/2005-LegislativeChangesStripout081005.pdf.

### From the Texas Register

The Texas Water Development Board (TWDB) proposes amendments to 31 TAC §§356.1-356.10 and new §§356.11-356.13 concerning Groundwater Management, Subchapter A, Groundwater Management Plan Certification. These amendments and new sections are proposed to conform to the statutory changes of House Bill 1763, 79th Legislature, Regular Session (2005) and pursuant to the four-year rule review requirement of Texas Government Code §2001.039. For more information go to http://lamb.sos.state.tx.us/texreg/sos/PROPOSED/31.NATURAL %20RESOURCES%20AND%20CONSERVATION.html#490.

The **Texas Board of Professional Engineers** has issued its final Policy Advisory Opinion regarding Water Quality Planning. For more information go to http://lamb.sos.state.tx.us/texreg/sos/in-addition/in-addition.html#724.

The **Texas State Soil and Water Conservation Board** (State Board) proposes an amendment to 31 TAC §523.4 to establish a time period for which the State Board shall refer a complaint to the Texas Commission on Environmental Quality (TCEQ) if the person upon whom a complaint was filed fails or refuses to take warranted corrective action. The time period being established is 45 days. For more information go to http://lamb.sos.state.tx.us/texreg/sos/PROPOSED/31.NATURAL%20RESOURCES% 20AND%20CONSERVATION.html#69.

The TCEQ adopts the repeal of §7.105 without changes to the proposal as published in the March 11, 2005, issue of the *Texas Register* (30 TexReg 1401). In 1998, the General Land Office and the TCEQ entered into a memorandum of understanding regard-

ing the governance and funding of the Galveston Bay Estuary Program. The memorandum of understanding is currently incorporated into TCEQ rules. At the time that the agencies entered into the memorandum of understanding, the 75th Legislature funded the Galveston Bay Estuary Program through the General Land Office's Coastal Protection Fund; however, the program was administered by the TCEQ. The following biennium, the 76th Legislature funded the Galveston Bay Estuary Program directly through the TCEQ, and that remains the case today. Additionally, that legislature clarified the roles and responsibilities of both agencies for estuary programs and designated the commission as the lead entity by enacting Texas Water Code (TWC), §§5.601-5.609. For more information go to http://lamb.sos.state.tx.us/texreg/sos/adopted/30.ENVIRONMENTAL%20QUALITY.html #244.

The TCEQ adopts amendments to §§213.4and 213.21 with changes to the proposed text as published in the March 11, 2005, issue of the Texas Register (30 TexReg 1403) and to §§213.1, 213.3, 213.12, 213.20, 213.22, 213.24, and 213.27 without changes. Chapter 213 regulates certain activities having the potential for polluting the Edwards Aquifer and hydrologically connected surface streams to protect existing and potential uses of groundwater and maintain Texas Surface Water Quality Standards. The activities subject to regulation are those that pose a threat to water quality within mapped geographic areas designated as the recharge, transition and contributing zones to the Edwards Aquifer on official maps adopted by the commission. For more information go to http://lamb.sos.state.tx.us/texreg/sos/adopted/30.ENVIRONMENTAL%20QUALITY.html #246.

### **Texas Board of Professional Geoscientists News**

The Texas Board of Professional Geoscientists (TBPG) passed a requirement in the August 2005 meeting for companies to register as a "Registered Company Performing Geoscience Services". Details will follow after development. This was the result of existing statutory guidelines and enforcement becoming proactive. The TBPG requests that violations be reported to it; the more details regarding the violation, the better. The TBPG will review all information submitted and it has investigative capabilities as well. To check on what violations may be, see the TBPG web page at www.tbpg.state.tx.us.

The TBPG has adopted amendments to the existing rule establishing a \$25 examination processing fee for all examinations administered by the TBPG, in addition to adopting language for payment of required fees as set forth by both the National Association of State Boards of **Government Update** continued on page 55

# GULF COAST ASSOCIATION OF GEOLOGICAL SOCIETIES GULF COAST SECTION OF SEPM

# CALL FOR PAPERS

56<sup>th</sup> ANNUAL CONVENTION **LAFAYETTE, LOUISIANA** 

HOSTED BY THE LAFAYETTE GEOLOGICAL SOCIETY

**September 25<sup>th</sup> – 27<sup>th</sup>, 2006** 



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Come on down and pass a good time in Lafayette, Louisiana, the Heart of Acadiana and Cajun Culture! We guarantee good food, good music, and of course a good show! We are pleased to announce our convention theme, "Visualize the Possibilities". Lafayette is host to the Louisiana Immersive Technologies Enterprise (LITE), a state-of-the-art 3-D visualization center currently under construction in the University of Louisiana Research Park. Their new 3-D Immersive Auditorium will be showcased as an integral part of the convention. We thus invite submission of abstracts for presentations related to all facets of Gulf Coast geology and technology, and especially encourage submission of abstracts related to visualization methods and technology. So come on down to "Visualize the Possibilities" firsthand and experience the "joie de vivre" of south Louisiana.

### THEMES FOR SUBMISSION

Presentations on all aspects of Gulf Coast geology are welcome. We especially invite presentations with the following themes:

3-D Visualization Technology and Methods

**Gulf Coast Case Histories** 

Salt and Faults

Sub-Salt Environments

**Deep Water Systems** 

Onshore Trends and Exploration

Seafloor and Shallow Mapping and Hazards

Coal Bed Methane

**Tight Gas Sands** 

**Outcrop Studies and Analogues** 

**Impact of Natural Disasters** 

**Environmental and Coastal Studies** 

### HOW AND WHEN TO SUBMIT

Abstracts of proposed presentations must be submitted in standard format (250 words or less; no figures or references) by **Jan. 16, 2006**. There are two ways to submit abstracts:

- 1) Connect to the GCAGS 2006 website, http://www.gcags2006.com and follow the instructions.
- 2) Mail a diskette or CD with the abstract in a .doc format, and a short note indicating your address, phone number and e-mail address. Also, indicate your preferred theme and preferred mode of presentation to:

GCAGS 2006 ABSTRACTS, 7190-C Cemetery Highway, St. Martinville, Louisiana 70582

**Oral, poster, visualization, or core presentations** will be accepted. Authors will be notified of acceptance on February 20, 2006. All presenters must submit a paper of <11 pages, or an extended abstract with key figures of ~2-4 pages by April 11, 2006. These will be published in the *Transactions*. Instructions will be posted on the GCAGS2006 website.

ABSTRACT DEADLINE: JAN. 16, 2006! Questions should be directed to James Willis at gcagstech@msn.com.

Geology (ASBOG) and the Council of Soil Science Examiners (CSSE) for administration of their specific examinations. Adopted amendments also establish a \$200 one-time temporary licensing fee for all geoscientists to practice in their respective field of geoscience in the State of Texas for no more than the mandated 90-day period as specified in the Geoscience Practice Act. The license renewal fee is now adopted to be \$168 and a newly adopted Verification of Licensure fee will be \$15. The Fundamentals and Practice fees for Geophysics are now adopted to be \$150 each. Legislation enactment in 2001 of Senate Bill 405 Subchapter D, §4.01 granted the TBPG general rulemaking authority to adopt and enforce rules consistent with this act necessary for the performance of its duties and §4.02 granted authority for the TBPG to set reasonable and necessary fees to be charged to all applicants and license holders, including fees for applications, examinations, licensure and renewal of a license including basing a fee for an examination in a discipline of geoscience on the costs associated with preparation, administration and the grading of the examination. The adopted amendments to the rule provide language clarity to the fee requirement for administration of each of the agency's examinations taken relevant to the applicant's geoscience discipline(s). The amendments also change the licensing fee structure through the inclusion of additional language to the existent licensing fee requirement as set by the Board, to establish both new fee requirements and increase to the renewal fee to allow the Board attainment of its appropriated general revenue funding level.

### **News from the American Geological Institute**

Eastern States Team Up to Reduce Power Plant CO<sub>2</sub>. After two years of collaboration, nine northeastern states have agreed to reduce power plant emissions in the region to 10% of current levels by 2020. On August 24, 2005, the New York Times obtained and reported on a confidential draft proposal for the regional initiative, which according to the Times is the first such cooperative regulatory action in the history of the United States. Although the proposal is not finalized, the Times interviewed one state official, who said, "we have very high hopes of getting a resolution through to all the states by the end of September."

Environmentalists who were interviewed in the article said that the proposal would achieve roughly the same emission reductions as those instituted under the Kyoto Protocol. A regional cap-and-trade program would freeze emissions at current levels starting in 2009, and further reductions would be enforced after 2015. However, because such a multi-state regulatory agreement is unprecedented, the new plan may have a greater impact on national environmental policy than on the environment itself. California, Washington and Oregon are already exploring a similar regional agreement that, together with the northeastern states' agreement, may exert considerable pressure on the federal government to change their position on greenhouse gas control.

Kansas Board of Education Approves Revised Science Standards. The full, 10-member Kansas State Board of Education voted on July 9, 2005, to accept a draft of revised science standards requiring students "to learn about the best evidence for modern evolutionary theory, but also to learn about areas where scientists are raising scientific criticisms of the theory." The Board voted 6-4 in favor of the draft despite written arguments from the science standards writing committee, who had originally excluded similar language.

Although the revised standards do not specifically advocate the teaching of intelligent design, the new language could bring such discussions into classrooms. Changes that were made on June 9, 2005, make reference to testimony offered during three days of hearings last May and state that "evolution is accepted by many scientists but questioned by some" and that "all scientific theories should be approached with an open mind, studied carefully and critically considered."

The revised science standards have been sent to an external review board based in Denver, Colorado. The review, at a cost of more than \$20,000, is intended to provide final legitimacy to the science standards. The review will be completed by October or November.

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## From the Editor continued from page 11.



Figure 5: Holly Beach, Cameron Parish, LA. (Hurricane Rita): In the lower photograph, note the sand deposit emerging from the flood waters in a mid-island location half way between the arrows, as well as landward of the main highway along the far-left side. (Photo and caption courtesy of the USGS)



1. Publication Title	2. Publication Number	3. Filing Date
Houston Geological Society Bulletin	0 1 8 _ 6 6 8	2 9-9-0:
4. issue Frequency Monthly except July and August	5. Number of Issues Published - hually 10 Issues	6. Annual Subscription \$24 Members \$30 Non-Members
7. Complete Mailing Address of Known Office of Publication (Not	printer) (Street, city, county, state, and ZIP+4)	Contact Person
10575 Katy Freeway Suite 290 Houston, Texas 77024-1097 Harris		Joan Henshaw
		Telephone 713-463-9476
<ol> <li>Complete Mailing Address of Headquarters or General Busines</li> </ol>	ss Office of Publisher (Not printer)	
Same as above	,	
9. Full Names and Complete Mailing Addresses of Publisher, Edite	or, and Managing Editor (Do not leave blank)	
Publisher (Name and complete mailing address)		
Houston Geological Society 10575 Katy Freeway Suite 290 Houston, Tex	xas 77024-1097	
Editor (Name and complete mailing address)		•
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13. Publication Title Houston Geological Society Bulletin			14. Issue Date for Circulation Data Below September 2005		
15. Extent and Nature of Circulation  a. Total Number of Copies (Net press nm)		Extent and Nature of Circulation	Average No. Copies Each Issue During Preceding 12 Months	No. Copies of Single Issu Published Nearest to Fili	
		of Copies (Net press run)	4170	3944	
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[Sum of 15b	(1),	Requested Circulation (2),(3),and (4)]	4120	3905	
d. <sub>Free</sub> Distribution	(1)	Outside-County as Stated on Form 3541	10	7	
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	ion (	(Sum of 15c. and 15f)	4180	3925	
Copies not Di	strib	uted	10	19	
Total (Sum of	15g.	and h.)	4170	3944	
Percent Paid and/or Requested Circulation (15c. divided by 15g. times 100)		Sg. times 100)	99.03%	99.49%	
		ternent of Ownership November			
		uired. Will be printed in theis	sue of this publication.	☐ Publication not required.	
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for a net storage of ~6.5 MMt CO<sub>2</sub>/yr. For comparison, a 500-MW pulverized coal power plant produces roughly 3 to 4 MMt CO<sub>2</sub>/yr. Since beginning injection of CO<sub>2</sub> in 1972, the SACROC unit has accumulated more than 55 MMt CO<sub>2</sub>. Hence, the site infrastructure at SACROC—which includes ~1850 wells, compression facilities and a CO2 distribution/injection network—is comparable to the scale of facilities that would be required for gigaton quantities of power plant CO<sub>2</sub>. (The current operator of the SACROC unit is Kinder Morgan CO<sub>2</sub> Company.)

With high oil prices in the \$60+ per barrel range, EOR in the Gulf Coast can provide an attractive market for CO2 produced by chemical plants and/or gasification of fossil fuels.

### Potential for CO<sub>2</sub>-Based Enhanced Oil Recovery in the **Gulf Coast**

The Gulf Coast has a large potential for CO<sub>2</sub> EOR, in which CO<sub>2</sub> injected at pressure into oil fields leads to the production of additional oil. Over the last year the GCCC has completed an assessment of geologic storage options in the Gulf Coast region. We inventoried 0.4 billion tons of CO<sub>2</sub> produced annually from 316 stationary sources in the region. Capture of CO<sub>2</sub> from these sources alone could supply a 680-mile pipeline infrastructure linking the Gulf Coast region in a network possibly extending to East Texas and into Mexico. Initially, the first segments of this regional pipeline network would link sources of high-concentration CO2 emissions, such as hydrogen plants and gasification plants, to EOR sites.

The Gulf Coast region contains 767 oil and natural gas reservoirs that could be used first for EOR and then for large-volume, longterm storage of CO2 in nonproductive formations below the reservoir interval. A key concept is that of stacked sinks. Below every oil reservoir are a number of deeper brine aquifers that could be reached by drilling deeper sequestration injection wells from existing drill sites.

Although there is no current market for CO<sub>2</sub> in Texas outside of the Permian Basin, there is an extremely strong likelihood that such a market will develop coincident with an a source of CO2 becoming available. Over the next few decades the largest volume of CO<sub>2</sub> sequestration based on CO<sub>2</sub> EOR in the United States will likely be the U.S. Gulf Coast. On the Gulf Coast, oil reservoirs often are characterized by relatively steep dips that result in gravitational buoyancy driving injected CO2 up dip. In fact, gravity provides the most effective force to suppress fingering in CO<sub>2</sub> EOR floods. This improves the sweep out and thus increases the percentage recovery of oil in place. Gravity-stable floods are achieved by injections of CO2 into a dipping reservoir at a rate slow enough that gravitational forces dominate over viscous forces. In this case the CO<sub>2</sub> forms a segregated layer of gas at the

top of the reservoir. Thickening of the layer of CO2 results in downward motion of a layer of mixed CO2 and oil. Under favorable conditions gravity-stable floods are the most efficient of all CO<sub>2</sub> EOR schemes.

As noted previously, today most CO<sub>2</sub> floods are being conducted in the Texas part of the Permian Basin. These reservoirs are typically shallow-dipping stratigraphic traps, not amenable to gravity-stable floods. Over the last 30 years, operators of CO<sub>2</sub>-EOR projects in the Permian Basin have mostly used the water-assisted gas (WAG) approach to CO<sub>2</sub> flooding. In this process, alternating slugs of CO2 and water are injected to minimize the poor sweep efficiency that results from fingering of flow into high permeability pathways. WAG floods in the Gulf Coast have typically resulted in recovery rates of oil-in-place of 15% to 20%. In contrast, pilot gravity-stable floods in the Gulf Coast in the early 1980s resulted in recovery rates as high as 60% to 70%. Clearly, gravity-stable floods are the best way to maximize sweep efficiency and recovery rates.

BEG engineers have estimated that outside of the traditional area of CO2 EOR in the Permian Basin, an additional 5.7 billion barrels of oil could be produced in Texas by using CO<sub>2</sub> EOR. By way of comparison, annual U.S. oil production is currently 3.2 billion barrels. At \$60 per barrel, the 5.7 billion barrels of incremental production is estimated to have a wellhead value of \$342 billion, generate \$52 billion in taxes and result in \$498 billion of economic activity (these estimates for economic impact were computed using the Texas Comptroller's economic model). This EOR activity could lead to the storage of more than 700 million tons (0.7 gigatons) of CO<sub>2</sub>, a relatively minor amount of storage in the context of a projected 75 gigatons of CO<sub>2</sub> emissions for the Gulf Coast over the next 50 years. The true prize would be that EOR would enable the construction of an infrastructure that would allow cost-effective storage of Gulf Coast power plant, refinery and chemical plant emissions from the oxidation of hydrocarbons for the next 50 years or more.

Development of EOR-based demand for CO<sub>2</sub> in the Gulf Coast can provide gasification plants with a market for the CO2 they produce from oxidizing fossil fuels.

### **Discussion and Conclusions**

The economic viability of future  $CO_2$  EOR floods in the Gulf Coast is enhanced by:

- The strength of oil prices with long-term (five-year) price projections in the \$60+ per barrel range (Barclay's Bank Energy Market Reports).
- · Increasing confidence that carbon sequestration credits will have a real economic value with EU credits now selling at \$25 a ton. HGS Northsiders Luncheon Meeting continued on page 58

### HGS Northsiders Luncheon Meeting continued from page 57

- The concentration of expertise in compressing, transporting and injecting CO2 that exists in the Gulf Coast. Much of the engineering for the Permian Basin CO2 EOR market is done by companies based in Houston.
- · The possibility of developing relatively cheap ways to capture CO2 by building gasification plants that would refuel existing natural gas turbine power plants, produce hydrogen for refineries and be part of FutureGen-like power plants based on IGCCC technology.

In practice there is risk associated with uncertainties in factors such as future crude oil prices, the large capital investments required for building large-scale CO2 pipeline networks and the future value of CO<sub>2</sub> credits. These uncertainties make companies reluctant to make the investments necessary to build the infrastructure of CO<sub>2</sub> capture plants, gasification plants, compressors and pipelines needed to create a CO2 sequestration industry. It is interesting to note that an economic incentive for CO<sub>2</sub> capture for EOR of \$20 per ton would result in a positive income for the state of Texas (for example) when taxes, royalties and increased economic activity are accounted for. Such incentives could encourage the building of capture facilities in chemical plants and gasification plants. Texas and the entire Gulf Coast region have a unique potential to create a new industry that has societal benefit and is financed in large part by increased oil recovery.

The Permian Basin in Texas has not only the largest  $CO_2$  market in the world but also the largest quantity of CO2 being actively placed into long-term storage. Texas also has exceptional opportunities to duplicate the successes of the Permian Basin in the development of both a profitable CO2 EOR industry and largescale, long-term storage of CO2 in East Texas and the Gulf Coast. Gasification of coal can play a critical role in this development. Gasification plants may be built in the Gulf Coast over the next few years in response to several different economic drivers:

- · Rising prices for natural gas will provide incentives to find new fuels for existing gas turbine plants.
- · Increasing demand for hydrogen for refining petroleum, together with the increasing cost of steam-reforming natural gas to produce hydrogen, will make gasification of cheap fuels such as petcoke and lignite more attractive.

• The increasing cost of adding scrubbers to pulverized coal power plants to meet more rigorous environmental standards may lead to construction of IGCC turbine power plants

The GCCC envisions the Gulf Coast region becoming a major site, perhaps the nation's predominant site, for a new carbonsequestration industry. The Gulf Coast has by far the greatest storage capacity in the country in its numerous deep saline brine aquifers. It also has large numbers of oil reservoirs suitable for CO<sub>2</sub> EOR that are collocated with the brine reservoirs. These sites are also in proximity to the bulk of the CO2 emissions and most of the proposed sites for construction of gasifiers in Texas.

### **Biographical Sketch**

IAN J. DUNCAN is Associate Director for Environment and Earth Systems at the Bureau of Economic Geology, The University of Texas at Austin. Dr. Duncan received a BA, Honors I, earth sciences, from Macquarie University, Sydney, Australia, in 1974 and a PhD in geology, from the University of British Columbia, Vancouver, Canada, in 1982. Dr. Duncan worked for ten years as a Scientist Manager at the



Virginia Department of Mines, Minerals and Energy Division of Mineral Resources. He also worked as a geology professor at SMU in Dallas and Washington University in St Louis. Dr. Duncan's interests lie in managing integrated grant/contractbased multidisciplinary research projects in a nonprofit organization, carbon management based on geologic CO2 sequestration, development and management of large-scale pilot projects for carbon capture and long-term storage, implementation of clean oil technologies, conceiving, designing, implementing and managing multidisciplinary geologic information management projects and modern geologic mapping, remote sensing, structural geology, knowledge management in the earth sciences, digital mapping/enterprise GIS and geochronology.

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## HGA and GeoWives News

The Houston Geological Auxiliary and its newcomer organization the GeoWives are enthusiastic about moving into the holiday season. The membership in both organizations has seen increases this year and we still welcome new members who wish to join. Many thanks to our membership chairmen Norma Jean Bacho (HGA), and Lois Matuszak, (Geo Wives) who have done an outstanding job.

Mark your Geo Wives' calendars for Thursday, November 10th and join us for Planning Holidays for Thanksgiving and Christmas. Wear your holiday clothes and bring your favorite dish for the luncheon along with your recipe to share. Home decorations and holiday fashions will be the theme, so come share your ideas with the group. Participation by all is encouraged but not required. This meeting will be at the home of Sara Nan Grubb, 11212 Memorial Drive between San Felipe and Greenbay. Call Sara Nan at 713-278-9369 for reservations and any questions you might have by November 4th.

On December 7th Geo Wives will tour St. Martin's Episcopal Church at 717 Sage Road at Woodway. We will meet in the narthex at 10:30 A. M. for the tour, and then have lunch in the Parish Hall following the tour. Mail your check for \$5.00 to Janet Steinmetz, 11734 Riverview Drive, 77077 to confirm your reservation for lunch.

On December 16th, fellow member Pat Austin, with her fourpart harmonies and sparkling piano, will perform a musical program for The Geological Auxiliary Christmas Luncheon to be held at the BraeBurn Country Club. This talented, up-beat



group will be performing Christmas music, an array of the best hits from Broadway, pop to swinging oldies and well-known spirituals. Chairperson Betty Alfred and her committee provide this great opportunity to get into that holiday spirit.

We welcome all members and guests to join us for these fun events.

Dene Grove Geo Wives President

As a HGA member you are invited to join

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# Please Pardon Our Re-Construction

The HGS Website management is undergoing a reorganiza-L tion. Please bear with us during the transition. We will continue to offer superior services including our calendar of interesting events, online reservations, credit card payments, JobBank listings, resume postings and online discussion forums.

The first HGS Website was built in 1997 by Dave Crane, Bill Osten and other members of the HGS Computer Applications Committee. Dave maintained the site initially and turned it over to Bill Osten. The initial site was maintained by manually editing the Web pages to post information. Online event reservations and credit card payments were not available. In September 2003, the HGS decided to redesign the Website and offer additional services to the membership. The HGS contracted the Schipul Web Marketing Company using their Tendenci database software to design a new site. The HGS also hired Dave Crane to manage

the transition to the new Website. Since September 2003, Dave has served as Webmaster of the HGS Website. Since the new Website offers expanded services, it requires a higher level of maintenance.

In mid-October 2005 Lilly Hargrave replaced Dave as Webmaster as part of a cost-cutting measure requested by the HGS Board of Directors. Lilly has been on the HGS office staff since July 2003 and will bring a lot of experience to her new responsibility. Please be patient with the HGS as we make this transition in Webmasters. If you have comments, suggestions or difficulties using the HGS Website be sure to contact Lilly via email: Webmaster@hgs.org or call her at (713) 463-9476.

Bill Osten

HGS Webmanager, HGS Website Committee Chair

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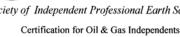
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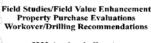
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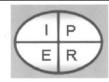
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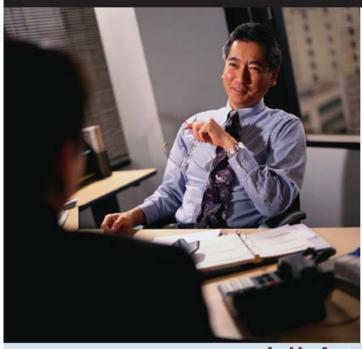
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14-15	Quick Look Techniques From Prospect Evaluation to Reserves Estimation	Houston, TX
19-23	Seismic Fundamentals for Exploration and Development	Houston, TX
29-30	Logbust™ Computer Application of Multiple Bischke Plot Analysis	Houston, TX
	(Seismic and Well Log Correlation Validation/Growth Analysis)	

### October, 2005

3-7	Applied Subsurface Geological Mapping	New Orleans, LA
13-14	AVO, Rock Physics and Inversion	Houston, TX
24-28	Development Geophysics	Houston, TX
24-28	Hydrocarbon Exploration in Extensional Systems	Houston, TX
31-11/04	Basin Analysis and Hydrocarbon Potential	Houston, TX

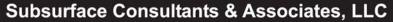
### November, 2005

7-11	Sequence Stratigraphy in Exploration and Production Geology	Houston, TX
14-18	Integration of Log and Seismic Data for Exploration, Exploitation and Production	Houston, TX

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