



Geophysical Society of Houston

VOL. 31, NO. 6

NEWSLETTER

FEBRUARY 1996

Secretary's Letter

Being Secretary for GSH is a somewhat anonymous position. Responsibilities like membership and balloting are important to the organization but mostly invisible to members. The main duty, of course, is maintaining the official records of our activities. This has become more difficult over the past few years with the changing of our organization. We are moving in the same manner as our employers have been changing, so they say. The GSH has empowered our appointed committee chairpersons to act more on their own. The prime examples are the five SIGs and the technical breakfasts, which are relatively autonomous operations. The membership seems to be responding enthusiastically to the direction of more, but smaller, technical meetings, and so we will continue with it. However, the ability of the Secretary to keep track of all of our activities at any one time is much more difficult. GSH is not like a single company with common electronic mail to all officers and committee chairs. It is more like the virtual corporation.

I have some experience with both the home office and the virtual office. Since retiring from the oil patch two years ago, I have been teaching at the community college. I have some trouble explaining to new acquaintances that "yes, I



Kenneth Russell
EarthView Associates

have a full time job, but, no, I don't have an office nor business cards nor a secretary nor can you phone or fax to me at work". Every tool that I have for my job sits on this desk.

My only specific goal for this year was to reduce the flow of GSH paper, while still performing the necessary functions of the office. The board had a small debate over the merits of electronic mail versus the automated fax. E-mail had to be rejected, at least for this year, as we have no common platform. In addition, many of the employers have security in place to keep outsiders like GSH away. Obviously a fax uses some paper, but we are using much less than before. Now every board member has a copy of the minutes immediately after the meeting, whether they attended or not, and without any hassle of envelopes and stamps. The 1995-1996 GSH minutes officially exist only on two computers, plus one floppy for safety. Any copies distributed later, for any reason, will only come on floppy disk in one of three IBM formats.

As I am writing this article, I am past the halfway point of my term in office. Thus far, I have personally consumed only four pieces of paper. Those four were all forms which I had to complete by hand, put into envelopes and mail to SEG in Tulsa. So much for their technology! Ask me at our annual meeting how well I did in saving trees for the rest of the year. For those of you who don't know me personally, I have hundreds of trees on my lot, but not a single blade of grass. I also remember well some years ago being Secretary of another organization, which required my spending about an hour each month just for copying and collating. When there were the inevitable additions or corrections, all of those pieces of paper were discarded and the whole process repeated. So we are making progress in increasing efficiency and preventing waste. Now I click on SEND and communicate with 42 people.

To the volunteers and participants who make GSH go, my personal thanks. May you all have a better 1996 (also 97, 98 and so on.) Special thanks to Sam LeRoy at EarthView, which is the home of the automated fax machine, and to Margaret at the GSH office.

INSIDE

GSH Meetings_____	
Technical Breakfasts	3, 7
Data Processing SIG	4
Reservoir Geophysics SIG	4
Technical Luncheon	3
Articles and Comments_____	
Meetings and Events	11
Membership Directory	7
Secretary's Letter	1
Social Events_____	
Bass Tournament	6
Golf Tournament	10
Honors & Awards Banquet	5
Tennis Tournament	9
Courses and Seminars_____	
Continuing Education	5
Training Survey	8

GSH/HGS/HAPL Annual Bass Tournament

Date: March 30 & 31, 1996
Place: Pendleton Harbor Marina,
 Toledo Bend Reservoir

For more information and registration form, [see page 6.](#)

GEOPHYSICAL SOCIETY OF HOUSTON

Margaret Blake, Office Manager • 7171 Harwin Drive, Suite 314 • Houston, Texas 77036-2190

(713) 785-6403 • Fax (713) 785-0553 • Office Hours 7 a.m. - 4 p.m.

Event Reservations Number: (713) 917-0218

1995-96 Officers and Committee Chairpersons

President (SEG Rep)	CHERYL S. STEVENS, Western	963-2123	Fax 963-2030
	P.O. Box 2469, Houston, TX 77252-2469		
Corporate Relations	Art Ross, Exxon	423-5476	Fax 423-5202
Historian	Tom Fulton, Seismic Solutions	464-1300	Fax 464-1615
Honors & Awards	Art Ross, Exxon	423-5476	Fax 423-5202
Museum	Bill Gilchrist, Exploration Consultant	782-5909	Fax 782-2626
Nominating	Cheryl Stevens, Western	963-2123	Fax 963-2030
Tellers	Ken Russell, EarthView Associates	358-7981	Fax 722-8003
President Elect (SEG Rep)	WULF F. MASSELL, EPIC Geophysical	650-3820	Fax 650-3822
	1221 Lamar #605, Houston, TX 77010		
Academic Liaison	Dale Sawyer, Rice University	285-5106	Fax 285-5214
Advisory	Lee Lawyer	531-5347	Fax 531-5347
Employment Referrals	Sam Leroy, EarthView Associates	722-8002	Fax 722-8003
Finance	Joe Stevens, Union Texas	968-2416	Fax 968-2417
Office	David Forel, Western	963-2493	Fax 963-2490
Volunteers	Wulf Massell, EPIC	650-3820	Fax 650-3822
First Vice President	PATRICK J. STARICH, Exxon	423-7234	Fax 423-7917
	233 Benmar, Ste. 837, Houston, TX 77060		
Continuing Education	Don Herron, BP	560-3778	Fax 560-8114
SIGS (Special Interest Groups):			
Reservoir Geophysics	Phil Inderwiesen, Texaco	954-6244	Fax 954-6113
Data Processing	Jozica Gabitzsch, Consultant	668-6036	Fax 668-0120
Interpretation Workstation	Larry Godfrey, Energy Dev.	750-7544	Fax 750-7584
Potential Fields	Brian Anderson, LCT	558-8383	Fax 558-8384
Environmental Applications	Stephanie Hrabar, GEMS ²	683-0638	Fax 683-0638
Speakers	Pat Starich, Exxon	423-7234	Fax 423-7917
Technical Breakfasts	Dave Agarwal, Interactive Interpretation & Trng.	650-0325	Fax 650-3822
Technical Luncheons	Phil Hoseman, Consultant	655-9838	Fax 655-7301
Technical Advisory	Bob Tatham, Texaco	954-6027	Fax 954-6113
Technical Transfer	Dan Ebrom, Univ. of Houston	743-9144	Fax 743-9164
Second Vice President	JOSEPH L. ALCAMO, Pluspetrol Int'l	513-4533	Fax 961-1097
	5599 San Felipe #1000, Houston, TX 77056		
Annual Meeting	Jim Moulden, Energy Graphics	659-2201	Fax 659-2301
Awards Banquet	Merry Lynn Southers, Business Archives	840-8282	Fax 599-9106
Bass Tournament	Greg Doll, Weeks Exploration	975-3700	
Christmas Party	Lorinda Driskill, Western Atlas Software	972-4693	Fax 666-9439
Golf Tournament	George Lauhoff, Digicon	630-4011	Fax 630-4311
Shrimp Peel	Joe Stevens, Union Texas	968-2416	Fax 968-2417
Sporting Clays	Robert Perez, Geotrace Technologies	497-8440	Fax 497-4619
Tennis Tournament	Joe Jones, Bartrum	438-5626	Fax 961-1535
Secretary	KENNETH RUSSELL, EarthView Associates	358-7981	Fax 722-8003
	2807 Valley Way, Kingwood, TX 77339		
Directory	Scott Sechrist, EnTec	464-8200	Fax 856-7445
GSH Membership	Steve Starr, Petroleum Technology	498-7008	Fax 498-0913
Ladies Auxiliary	Carol Gafford	370-3264	Fax 366-7564
OTC Representative	Alf Klaveness, Klaveness Research	468-5123	Fax 468-0900
SEG Membership	Jill Floto, Jill Floto & Associates	974-0822	Fax 974-1928
Treasurer	DAVID FOREL, Western Geophysical	963-2493	Fax 963-2490
	P.O. Box 2469, Houston, TX 77252-2469		
Student Loans	Don Ashabranner, Phillips	669-3782	Fax 669-3725
Editor	PAMELA M. MOORE, New World Horizon	773-2627	Fax 773-9620
	P.O. Box 740099, Houston, TX 77274		
Assistant Editor	Cliff Kelley, Schlumberger Well Services	368-8103	Fax 368-8184
Company Contacts	Scott Sechrist, EnTec	464-8200	Fax 856-7445
Electronic Publishing	Victor H. Koosh, New World Horizon	773-2627	Fax 773-9620
Houston Events Calendar	Jock Drummond, Anadarko	873-3901	Fax 873-1359
Photography	John Freeland, Exxon	423-7223	Fax 423-7801
Publicity	Scott Sechrist, EnTec	464-8200	Fax 856-7445
Technical Training Notices	Lloyd Weathers, Mobil	775-2453	Fax 775-4123
Past President (SEG Rep)	ARTHUR H. ROSS, JR., Exxon	423-5476	Fax 423-5202
Prior Past President (SEG Rep) ...	THOMAS K. FULTON, Seismic Solutions	464-1300	Fax 464-1615
SEG Section Representative	Bill Gafford, Amoco Production	366-7873	Fax 366-7569
SEG Section Representative	Hugh Hardy, Consultant	729-9208	Fax 726-0456
SEG Section Representative	Lee Lawyer	531-5347	Fax 531-5347
SEG Section Representative	Don Robinson, InDepth Technology	395-2749	Fax 395-5149
Alt. SEG Section Rep.	Brian Anderson, LCT	558-8383	Fax 558-8384
Alt. SEG Section Rep.	Ralph Baird, Baird Petrophysical	461-1784	Fax 461-0914
Alt. SEG Section Rep.	Merry Lynn Southers, Business Archives	840-8282	Fax 599-9130

The Geophysical Society of Houston Newsletter (ISSN 1082-0817) is published monthly except July and August by the Geophysical Society of Houston, 7171 Harwin, Suite 314, Houston, Texas 77036. Subscription to the Geophysical Society of Houston Newsletter is included in the membership dues (\$20.00 annually). Second-Class Postage Paid in Houston, Texas.

POSTMASTER: Send address changes to Geophysical Society of Houston Newsletter, 7171 Harwin, Suite 314, Houston, TX 77036-2190.

Technical Luncheon

Date: Monday, February 12, 1996
Place: HESS, 3121 Buffalo Speedway
Time: Social, 11:30 a.m.
Meeting, 12:00 noon
Cost: \$17 Pre-registered GSH members
\$22 All Others
Topic: **3-D Seismic Discontinuity for Faults and Stratigraphic Features: The Coherence Cube**
Speaker: Mike B. Bahorich, Amoco

Please make reservations by calling the GSH reservation number **917-0218** prior to noon, Friday, **February 9**.

Seismic data are traditionally acquired and processed for the purpose of imaging seismic reflections. This paper describes a method of processing seismic data for the purpose of imaging seismic discontinuities including faults and stratigraphic features (U.S. and foreign patents pending, Bahorich and Farmer). One application of this non-traditional process results in a 3-D data volume, or cube, of coherence coefficients, within which faults are revealed as numerically separated surfaces. This is the first known method of revealing fault surfaces within a 3-D volume for which no fault reflections have been recorded.

3-D seismic data are generally binned into a regular grid. By using relatively simple mathematics to calculate localized waveform similarity in both the in-line and cross-line directions, estimates of 3-dimensional seismic coherence are obtained. Small regions of seismic traces cut by a fault surface generally have a different seismic character than corresponding regions of neighboring traces. This results in a sharp discontinuity in local trace-to-trace coherence. Calculating coherence for each grid point along a time slice results in lineaments of low coherence along faults. When this process is repeated for a series of time slices, these lineaments become fault surfaces.

Since coherence is calculated from non-interpreted seismic data, it can quickly provide the geoscientist with a non-biased view of regional faulting and stratigraphic features. Unlike time slices, faults are revealed equally well whether parallel or perpendicular to bedding. Coherence displays simultaneously image structural and stratigraphic features and can aid in recognizing the interrelationship between them.



Mike Bahorich received a bachelor's degree in geology (1979) from the University of Missouri-Columbia and a Master's in geophysics (1981) from Virginia Polytechnic Institute. His first decade at Amoco involved prospect generation and development. He then spent three years with Amoco Research in Tulsa and is currently providing 3-D seismic interpretation and consulting for the company's onshore U.S. operations.

Steven Farmer, co-author, attended Oklahoma State University in the early 1970s. He began his programming career with Cities Service in 1978. His programming experience includes both systems and seismic applications. Steve is currently a senior computer analyst at Amoco's Technology Center in Tulsa.

Technical Breakfast – February

Date: Wednesday, February 7, 1996
Time: 7:30 - 9:00 a.m., Technical Presentation will start at 8:00 a.m.
Place: Western Geophysical, 10001 Richmond, Second Floor Cafeteria
Cost: NO CHARGE, underwritten by Western Geophysical Company
Topic: **Geophysical Imaging of Subsalt Geology**
Speaker: Davis Ratcliff
Diamond Geophysical Service Corporation

Advance reservations urged — The host company needs an accurate headcount. Please call GSH (917-0218) prior to Monday, **February 5**.

Exploration and production of huge subsalt hydrocarbon accumulations in the Gulf of Mexico has been an ambitious challenge for many explorationists throughout the industry. The complexities associated with the three dimensional nature of salt structures, as well as the highly deformed tops and bottoms of salt, demand 3-D Prestack Depth Migration (3-D PreSDM) technology in order to correctly stack and position reflectivity below salt. Application of "large-volume" 3-D PreSDM techniques has been, and will continue to be, instrumental in unraveling the structural and stratigraphic complexities of the subsalt environment. "Large-volume" 3-D PreSDM technology allows the explorationist to better assess subsalt exploration and development risk, as well as improve subsalt exploration success.

In this paper, we discuss a full-volume 3-D PreSDM case study that, to our knowledge, is the largest prestack depth imaging project ever attempted to date. The 3-D PreSDM case study is centered over the Mahogany Discovery in the Gulf of Mexico's Ship Shoal South Addition Block 349 area. Information about input and output data coverage, computer run times and 3-D depth imaging strategies will be discussed. Numerous examples of closely spaced 3-D prestack depth migrated seismic data will also be shown in order to demonstrate how "large-volume" 3-D PreSDM technology improves subsalt imaging, both structural and stratigraphic, as well as subsalt prospecting. Additionally, geophysical technologies used to assist in the understanding of subsalt stratigraphy and subsalt lithology (e.g., 3-D subsalt AVO) will be included in the presentation.

Davis Ratcliff is Executive Vice President of Diamond Geophysical Service Corporation and President of the recently formed Diamond Geoscience Research Corporation. He has been involved in the geophysical imaging of complex salt geologies worldwide for the past 13 years and has applied 3-D imaging technology to more than 100 salt structures. Before joining Diamond, he was supervisor of geophysical technology for Amoco Production Co., U.S.A. and European exploration business units. In 1992, Davis received the Best Paper Award at the CSEG Convention in Calgary for his presentation on Steep Dip Imaging, and in 1993 received the Best Poster Paper Award at the SEG Convention in Washington DC. Davis is the 1994 recipient of the Society of Exploration Geophysicists Virgil Kauffman Gold Medal award for his work in 3-D structural imaging. Ratcliff holds a BS in mathematics from the University of New Orleans.

Please fax your suggestions to Dave Agarwal at 650-3822 for the "Best of GSH" series Breakfast Meetings regarding Topics, Speaker, Place and Potential Sponsors.

Reservoir Geophysics SIG

The Reservoir Geophysics Special Interest Group is an interdisciplinary forum for the discussion of reservoir geophysics topics of interest to geophysicists and geologists, and expanded interchange with the reservoir engineering community.

Date: Thursday, February 15, 1996
Time: 4:00 p.m.
Place: Chevron Petroleum Technology Company
2202 Oil Center Ct. (Building is just off of the Hardy Toll Road and Richey Rd. Visitor's parking is in front of the building with additional parking in the back.)
Cost: NO CHARGE
Topic: **Reservoir Characterization Technique**
Speaker: David E. Moore, CPTC
Coordinator: Phil Inderweisen, Texaco
Organizer: David E. Moore, CPTC

For reservations please contact David Moore at 230-2960; or FAX at 230-2669; or e-mail: mode@chevron.com.

Field Wide Formation Pressure Gradient and Fracture Pressure Characterization

D. E. Moore, S. Sarkar, and H. E. Goodman,
Chevron Petroleum Technology Company

Field wide characterization of formation pore pressure and fracture gradients are being performed using a newly developed analytical technique that integrates seismic geophysics, open hole logs, drilling performance data and a proprietary formation mechanical property program. Interval transit time (ITT) data is extracted from surface seismic surveys at calibration wells and undrilled location using proprietary and vendor supplied programs. A specialized processing flow is then developed to enhance the signal quality and frequency content of the seismic data necessary to produce optimized pseudo sonic curves according to depth.

Offset well open hole sonic log calibration permits pore pressure overlay construction using the ITT data set at the control well site. This overlay is then used with the ITT trace generated at the undrilled well location to estimate pore pressure at various depths. Additionally, field wide pore pressure attribute cubes can be generated using 3-D velocity data. Specific pore pressure horizons are used to map equipotential pressure surfaces to optimize well planning and to assess possible fluid migration pathways and barriers.

Formation fracture pressure gradients are estimated at the undrilled well location using the ITT and pressure data coupled with Chevron's proprietary Rock Mechanics Algorithm (RMA) program. The RMA program estimates formation strength and stress field magnitudes surrounding the borehole to determine wellbore stability attributes.

To date, the technique has been utilized in West Africa, South America, Western Australia, the North Sea and the Gulf of Mexico. Results from some of these areas will be presented.

continued on page 5

Data Processing SIG

Date: Wednesday, February 21, 1996
Time: Social, 4:30 p.m.
Presentations, 5:00 p.m.
Place: Shell Bellaire Technology Center, BTC-A164
3737 Bellaire Blvd. (near Stella Link)
Park at 3737 or 3747 Bellaire Blvd.,
enter at 3737 Bellaire Blvd.
Cost: NO CHARGE
Topic: **Multiple Suppression**
Organizers: Jozica Gabitzsch, Guillaume Cambois
Speakers: Simon Spitz, Bill Dragoset

Please make reservations by calling the GSH reservation number at 917-0218 no later than Monday, **February 19.**

An Interpreter Driven Anti-multiple Technique

Simon Spitz (CGG)

Strong multiple reflections often obscure interpretation of underlying structures and are unfortunately difficult to remove using standard processing techniques. A method based on targeting specific multiple events has proven much more effective. The idea is to interpret a series of primary reflections and to predict the train of multiples they would generate. Then, the actual elimination of multiples present in the data volume is achieved using a pattern recognition technique: everything that "resembles" the modeled multiples in an area of interest is removed. Modeling multiples can be straightforward (e.g. direct multiples or peg legs generated by a flat sea floor) but most of the time it requires an understanding of travel paths through sometimes complicated structures (e.g. subsalt or internal multiples). At this stage interaction with an interpreter familiar with the local geology is a key to successful results. The pattern recognition technique is a powerful tool to remove multiples because it is not limited by standard constraints such as periodicity or NMO differentiation. The risk of removing some primary events that would "looklike" multiples is considerably reduced by the 3D implementation of the method. Examples of this procedure will be shown using both synthetic and real data.

Surface Multiple Attenuation and SubSalt Imaging

Bill Dragoset* and Scott McKay (Western Geophysical)

Surface multiple attenuation (SMA) is a prestack inversion of a surface-recorded, 2-D wavefield that removes all orders of all surface multiples present within the wavefield. Also, in theory, the process can determine the acquisition wavelet imbedded in the wavefield. SMA requires no assumptions or modeling regarding the positions, shapes, or reflection coefficients of the multiple-causing reflectors. Instead, SMA relies on the internal physical consistency between primary and multiple events that must exist in any properly recorded marine data set.

A general SMA inversion equation can be derived in a simple fashion from just two assumptions: 1) the recorded wavefield is a superposition of primary events, 1st-order sur-

continued on page 5

Reservoir Geophysics SIG

continued from page 4

David Moore joined Gulf Oil in 1974 at their research center in Harmville, PA where he worked on development of new digital processing techniques - 2D & 3D and had various domestic and international interpretation assignments. David joined Chevron with the Gulf/Chevron merger in 1985-1986 where he supervised development of the onboard 3D seismic processing system for Research Vessel - R/V Hollis Hedberg which processed six 3D seismic surveys in the Gulf of Mexico in 85-86. He transferred to Chevron U.S.A. in 1986 and from 1986-1994 worked on various Development Geophysics assignments concerning the acquisition, processing, and interpretation of 3D seismic surveys in the Gulf of Mexico. In April 1994, David transferred to Chevron Petroleum Technology Center where he has been working with Chevron's Drilling Technology Center on integrating the Geophysical and Engineering disciplines for reservoir characterization studies. He has a B.S. in Geophysics from Texas A&M and is an active member of SEG and GSH.

Continuing Education

The following short course is being sponsored by the Dallas Geophysical Society.

Date: Thursday, March 28, 1996
Place: Radisson Hotel Dallas
(8 minutes from Love Field)
Time: 1:00 - 8:00 p.m.
Topic: **A Practical Approach to Seismic Imaging of Complex Geology**
Instructors: Matthew Brzostowski, Davis Ratcliff

For more information, please contact Victoria Sublette at (214) 509-3963.

GSH Annual Honors and Awards Banquet

Date: Wednesday, May 8, 1996
Place: Lakeside Country Club
Time: 6:30 p.m. - Cash Bar
7:15 p.m. - Dinner

Note the change from the first Thursday in May to Wednesday, May 8th. Please join us to honor our 25-year and 50-year SEG friends and co-workers. You will also have a chance to visit with many of our distinguished GSH and SEG associates. We particularly encourage those who have been honored in past years to return to honor this year's recipients. More details in later Newsletters.

Data Processing SIG

continued from page 4

face multiples, 2nd-order surface multiples,..., and Nth-order surface multiples; 2) a recursive relationship can be found that allows Nth-order surface multiples to be predicted given the primary wavefield and the surface multiples of order N-1. A specific inversion equation is obtained depending on the nature of the wavefield and whatever relationship is used to satisfy the second assumption. Thus, for a 1-D earth, SMA inversion is accomplished by deconvolution (Riley, D. C., and Claerbout, J. F., 1976, 2-D multiple reflections: Geophysics, 41, 592-620). For a 2-D earth, one can use the Kirchhoff integral in the second assumption and obtain Verschuur's algorithm (Verschuur, D. J., 1992, Surface-related multiple elimination in terms of Huygens' sources: Journal of Seismic Exploration, 1, 49-59), or one can use the 2-D scalar wave equation and obtain Riley and Claerbout's algorithm. The example shown in this talk was computed using a method similar to that of Verschuur.

Because SMA handles all surface multiples, it is an ideal method of removing surface multiples generated by the top and bottom of salt layers. An example line from the Gulf of Mexico has shown that SMA can attenuate salt-layer multiples better than can other multiple attenuation algorithms. Since such multiples obscure reflection events from below the salt layer, removing them is an important step in any attempt to image below the salt.

Simon Spitz received a D. SC. in 1976 from the University of Brussels. He was then involved in post doctoral research work at Orsay and Legnaro Laboratories for Nuclear Physics and from 1978 to 1982 at the Institute of Earth Sciences, University of Padua. He joined C.G.G. in 1982 where his actual position is Chief Scientist, Geophysical Research. He is author of over 60 research papers, published in various journals, or presented at various international conventions. He is a member of EAEG and SEG.

William H. Dragoset, Jr., received a BA degree in physics from Auburn University (1972), and an MA (1975) and a PhD (1978) in physics from Rice University. Since 1979 he has worked at Western Geophysical; he is currently a senior scientist in the Geophysics R&D group. In the early 80's, he was involved in the design, testing, and modeling of air gun source arrays. Also at that time he designed and programmed post-survey software algorithms used to process the navigation and positional data acquired during 3D marine seismic surveys. The air gun work led to research into the issue of air gun array specifications and their relation to seismic data quality. More recently, he has worked on multiple suppression, noise attenuation, and processing of dual-sensor OBC data. In 1988 Bill received the Outstanding OTC Geophysical Paper Award for a paper about marine vibrators. He holds seven patents related to seismic data acquisition and processing. Bill has been an SEG member since 1979 and a member of the Research Committee and the OTC/SEG Technical Program Subcommittee for many years, serving as Chairman of the latter for two years. He was an Associate Editor of GEO-PHYSICS for Seismic Data Acquisition in 1988-89. Bill is presently serving as 2nd Vice President on the SEG Executive Committee. He is also a member of the EAEG and the GSH.

Northside Breakfast — March

Date: Wednesday, March 6, 1996
Time: 7:30 - 9:00 a.m., Technical presentation will begin at 8:00 a.m.
Place: Wyndham Hotel Greenspoint
Cost: NO CHARGE
Topic: **Analysis of Subsalt Reflections at a Gulf of Mexico Salt Sheet Through 3-D Depth Migration and 3-D Seismic Modeling**
Speaker: G.G. Lewis, EPRC

Advance reservations urged — The host company needs an accurate head count. Please call GSH Reservations at 917-0218 prior to Monday, **March 4**.

An integrated, iterative approach was used to develop a velocity model and depth images of subsalt reflectors beneath a Gulf of Mexico salt sheet. The initial images contained artifacts due to at least three factors:

- errors in the velocity model,
- approximations in the migration algorithm, and
- insufficient subsurface sampling.

These factors combined to produce features which mimic faulting and stratigraphic variation in the subsalt section. A careful rework of the migration velocity model produced images with a much simpler subsalt section. A seismic modeling study was conducted to understand the impact of the migration algorithms and poor subsurface sampling on the images. Two and Three-dimensional raytrace modeling demonstrate the impact of line orientation on our ability to illuminate subsalt reflectors. Two-dimensional raytracing, wave equation modeling, and imaging of the model data allowed us to quantify the impact of poor illumination on our depth images.

We conclude that the most sophisticated imaging algorithms, properly applied, can still produce distorted images of the subsurface. Thus it is important to understand the factors which produce these distortions and to be able to identify their impact on the final image. This case history demonstrates one approach to analyzing the impact of such factors on depth images. It also illustrates some of the strengths and limitations of current depth imaging technology.

Authors: G. G. Lewis, C. J. Finn, W. A. Schneider, Jr., and K. T. Young, Exxon Production Research Co.

Gary Lewis received a B.S. degree in Physics and Geophysics from the University of Utah in 1980, and an M. S. degree in Applied Mathematics from the University of Colorado in 1989. He has been employed by Exxon since 1980; as a geophysical interpreter in the Exploration Department from 1980 until 1989, and as a research geophysicist at Exxon Production Research Company since 1989. His current research interests include seismic modeling, interpretation, and imaging of complex structures.

GSH 1996 Annual Membership Directory

Scott Sechrist, Directory Chairman
EnTec Energy Consultants

Membership Information Corrections and Additions Due by March 15.

Recently, HGS Directory Committee Chair Dave Henry (North Central Oil Company) and I discussed establishing realistic deadlines to achieve a more accurately updated directory. Historically all information and advertising submissions were requested in the Fall. Local convention activity this past year took precedence, but we can turn this to our advantage and actually improve our accuracy by asking for the submissions now, thus the information is more timely. As most members are aware, no commercial directory offers members' personal information as the HGS/GSH Joint Membership Directory does.

Through the course of the last year my copy of the Directory has been marked in many places to note a new phone or fax number or change of address. Making the updates for an accurate 1996 Directory is a task that must be shared by all members. It is vital that every member contribute a few moments to check both your personal listing and your company listing in the 1995 GSH/HGS Directory. Phone any additions or corrections to Margaret Blake at the GSH office at (713) 785-6403, or fax to (713) 785-0553. The deadline is March 15, but as with all projects of this scale, the sooner the better! Remember, it's your Membership Directory.

Directory Advertising Due by March 31.

The HGS/GSH Directory Committees have begun the annual bidding process for the printing of the 1996 Joint Membership Directory. The Directory is one of the largest annual financial investments made by your societies. The cost of this \$16,000+ annual investment is supported by those companies and individuals who place advertising in your directory. Without this advertising support, any shortfall must be made up from both societies' general funds.

The GSH/HGS annual membership directory is one of the few venues for placing display or classified advertising with the GSH. Looking for more visibility? Consider advertising in the Directory this year. The deadline for all advertising submissions is March 31. Your next opportunity will be a full year away.

Advertising rates are as follows:

Business card	\$50
Half Page	\$400
Full page	\$750
Inside Front Cover or Inside Back Cover	
Half Page	\$500
Full Page	\$1000
Outside Back Cover	
Half Page	\$750

To place your advertising in the Directory, please call Dana Morgan Blum, Directory Advertising Coordinator, at (713) 896-4499.

GEOPHYSICAL SOCIETY OF HOUSTON TRAINING SURVEY

GEOSCIENCE COURSES IN THE HOUSTON METROPOLITAN AREA

Please take a moment to complete this training survey. Whether you are interested in: Sharpening your skills sets; Changing career focus or; Learning about a new area or technique, the compiled results of this survey will help training providers in Houston tailor their programs to better meet your needs.

1. I am interested in the following training formats:
 - Short Course Vendor Training
 - Formal Course for College Credit
2. Are all of your training needs being met by in-house training?

Yes No N/A
3. How many continuing education offerings did you attend in 1995?

0 1 2 3 4 5 over 5
4. On average how long were they?

1/2 day 1 day 2 days 3 days

4 days 5 days over 5 days _____
5. On average how long would you like them to be?

1/2 day 1 day 2 days 3 days

4 days 5 days over 5 days _____
6. How many do you plan to attend in 1996?

0 1 2 3 4 5+
7. I am able to attend classes from
 - 8:00 a.m. to 4:00 p.m. on weekdays.
 - 4:00 p.m. to 5:30 p.m. on weekdays.
 - 5:30 p.m. on weekdays.
 - on Saturdays
8. I prefer courses meeting:
 - three times a week for 1 hour
 - twice a week for 1.5 hours
 - once a week for 3 hours
9. I would consider taking a course in the following non-traditional formats:
 - Internet Video Tape
 - Interactive Multimedia on CD-Rom
 - Broadcast Television
10. I would consider taking a course taught at:

North Harris College Main Campus (1960 & 45)

Yes No

University of Houston (UH) Main Campus

Yes No

UH at West Houston Institute (E. Katy)

Yes No

UH in Montgomery County (Woodlands)

Yes No
11. I am interested in working toward a college degree.

Yes No
12. If answering yes to 11, then please answer the following. I am interested in working toward an:

Associate's Bachelor's Master's Doctorate

(circle as appropriate)

in Geology Geophysics Other _____

(circle as appropriate)
13. My training needs include parts of the traditional academic curricula of Geology and Geophysics.

Yes No
14. My training needs include computer and workstation based applications and concepts in Geology and Geophysics (3-D Interpretation, GIS, Modelling, Systems, etc.).

Yes No
15. I have an

Associate's Bachelor's Master's Doctorate

(circle as appropriate) in _____.
16. My technical area of responsibility is:
 - acquisition computer applications
 - processing technician
 - interpretation other _____
17. I have _____ years of working experience.
18. My company has a reimbursement policy for continuing education including formal courses for college credit.

Yes No
19. Would you mind being contacted by phone for participation in a more in-depth survey? If so, please add your name and phone number.

NAME _____

PHONE NUMBER _____

BEST TIME TO CALL _____

Please FAX or mail back to: **Dan Ebrum**
AGL, University of Houston
Houston, Texas 77204-4231
FAX: (713) 743-9164
e-mail: ebrom@uh.edu

❖ 1995 GSH Tennis Tournament ❖

The 1995 GSH Tennis Tournament on December 1, 1995 was a spirited success with 20 tennis players and the responsive and generous support of the SPONSORS. The tournament provided GSH members an opportunity to wind down the year with each other and enjoy the competition of friendly tennis matches. There were three flights with four teams for the "A" flight, six teams for the "B" flight and three teams for the consolation flight. The planned joint tournament with the Houston Geological Society was not consummated as the HGS held their tournament in early '95. We plan to work on this for 1996.

THE WINNERS ARE:

"A" FLIGHT

1st: John Baxter – Gerard Hoffmann

2nd: John Adamick – Steve Stanley



"B" FLIGHT

1st: Bob Vivian – Bill Crook

2nd: Fritz Kronberger – Tom Holloway



"C" FLIGHT

1st: Khalid Razvi – Bill Powers

2nd: Dennis Steele – Ross Saunders



Trophies were presented to Winners and Runners-up. All players won a door prize from an imposing array of prizes and gifts which included tennis racquets, warm-up suits, and tennis shirts. The success of the tournament can be attributed directly to the SPONSORS. Their sponsorship provided for excellent food, beverages, and prizes of outstanding quality. A special tribute is awarded to the following sponsors:

Milt Cobb, Inc.
Grant Geophysical
Indel-Davis, Inc.
Landmark Graphics
Ovation Data Services, Inc.

PI/Richardson Seismic Inc.
Seitel, Inc.
Symtronix
TGS-Calibre
Transylvania Geophysical Corp.

Special thanks to the following volunteers for their hard work and management of the tournament: Margaret Blake at the GSH office, Bill Steiner and Bill Powers. The staff of Chancellors Racquet Club and Chancellors Catering are also commended for their services.

The 1996 Tennis Tournament is planned for October 4, 1996.

THANKS EVERYONE!

Joe Jones
 GSH Tennis Tournament Chairman

Golf Tournament and Dinner Geophysical Society of Houston

DATE: Monday, April 8, 1996
PLACE: Kingwood Country Club
TIME: 9:30 a.m. Registration
 11:30 a.m. Tee Off (Shotgun)
FORMAT: Four Man Florida Scramble
COST: \$90.00 — GSH Members & Guests
DEADLINE: March 15, 1996

Please mail entries to:
 Digicon Geophysical Corp.
 3701 Kirby Dr., Suite 1118
 Houston, Texas 77098
 Attn: George Lauhoff

Make checks payable to:
Geophysical Society of Houston

Golfers: read carefully

No entry will be accepted until the entry form and fees are received in full.
NO EXCEPTIONS!

Mulligans \$5.00 each (max. 2/person)
 Available at check-in



GOLF TOURNAMENT FORM

You may select your own foursome; if not you will be assigned to a group. The first name listed will be considered the TEAM SPOKESPERSON.

Name: _____

Circle: Member Guest

Co. _____

Phone: _____ HDCP. _____

Name: _____

Circle: Member Guest

Co. _____

Phone: _____ HDCP. _____

Name: _____

Circle: Member Guest

Co. _____

Phone: _____ HDCP. _____

Name: _____

Circle: Member Guest

Co. _____

Phone: _____ HDCP. _____

Course Preference : MARSH
 (CIRCLE ONE) LAKE
 ISLAND

DINNER ONLY

Name: _____

Name: _____

Cost for Dinner \$15.00

Houston Meetings

February 7

Best of GSH, Westside Breakfast

Geophysical Imaging of Subsalt Geology

Davis Ratcliff, Diamond Geophysical

Western Geophysical, 10001 Richmond

7:30 - 9:30 a.m.

Reservations by Monday, February 5, 917-0218

February 12

GSH Technical Luncheon

3-D Seismic Discontinuity for Faults and Stratigraphic

Features: The Coherence Cube

Mike B. Bahorich, Amoco Corp.

HESS, 3121 Buffalo Speedway

Social Period 11:30 a.m. Luncheon 12:00 noon

Reservations by noon Friday, February 9, 917-0218

February 12

HGS and HAPL Joint Dinner Meeting

Recent Environmental Impacts on Oil and

Gas Exploration and Production

William Feathergail Wilson

Post Oak Doubletree, 2001 Post Oak Blvd.

Social Period 5:30 p.m.

Dinner and Meeting 6:30 p.m.

Reservations by noon Friday, February 9, 917-0218

February 15

GSH Reservoir Geophysics SIG

Reservoir Characterization Technique

David E. Moore, CPTC

Chevron Petroleum Technology Corp, 2202 Oil Center Ct.

4:00 p.m.

Reservations call David Moore, 230-2960.

February 15

HGS Environmental/Engineering Geologists

Dinner Meeting

Bioremediation Processes for Ground Water Discharge

Calvin H. (Herb) Ward

Steak & Ale, 8150 Katy Freeway

Dinner 6:00 p.m., Meeting 7:00 p.m.

Reservations by noon Monday, February 12, 917-0218.

February 15

SIPES Luncheon

Petroleum Club, 11:30 a.m.

February 19

HGS North American Explorationists and International Explorationists Joint Dinner Meeting

Play Attributes of Cretaceous Rudist Reef Reservoirs — Examples from the Gulf of Mexico and Middle East

Jeffrey J. Dravis

Doubletree Post Oak, 2001 Post Oak Blvd.

Social Period 5:30 p.m., Dinner & Meeting 6:30 p.m.

Reservations by noon Friday, February 16, 917-0218.

February 21

GSH Data Processing SIG

Multiple Suppression

Simon Spitz; Bill Dragoset

Shell Bellaire Technology Center, 3737 Bellaire Blvd.

4:30 p.m.

Reservations by Monday, February 19, 917-0218.

February 28

HGS Luncheon Meeting

Excavating an Oil Field Dinosaur —

The Key to Dipmeter Quality

Laura Bigley Puzio; Anita R.P. Breimayer

Houston Club, 811 Rusk

Social Period 11:30 a.m.; Lunch & Meeting 12:00 noon

Reservations by noon Monday, February 26, 917-0218.

March 6

Best of GSH, Northside Breakfast Meeting

Analysis of Subsalt Reflections at a Gulf of Mexico

Salt Sheet Through 3-D Depth Migration and

3-D Seismic Modeling

G.G. Lewis, EPRC

Wyndham Hotel Greenspoint

Breakfast 7:30 a.m., Meeting 8:00 a.m.

Reservations by noon Monday, March 4, 917-0218

Events

March 30-31

GSH/HGS/HAPL Annual Bass Tournament

Pendleton Harbor Marina

April 8

GSH Golf Tournament and Dinner

Kingwood Country Club

April 10-11

Gulf Coast SEG Meeting

Exxon Auditorium, 800 Bell

May 8

GSH Annual Honors & Awards Banquet

Lakeside Country Club

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
<h1>February 1996</h1>				1	2	3
4	5	6	7 BEST OF GSH WESTSIDE BREAKFAST 7:30 A.M. WESTERN GEOPHYSICAL	8	9	10
11	12 HGS/HAPL JOINT DINNER GSH TECHNICAL LUNCHEON 11:30 A.M. HESS	13	14	15 HGS ENV./ENG. DINNER SIPES LUNCHEON RESERVOIR GEOPHYSICS SIG 4:00 P.M. CHEVRON	16	17
18	19 HGS N. AMER./ INT'L DINNER	20	21 DATA PROCESSING SIG 4:30 P.M. SHELL	22	23	24
25	26	27	28 HGS LUNCH	29	Submittals and suggestions should be sent to the GSH Editor at 7171 Harwin, Suite 314, Houston, TX 77036-2190, or call Pam Moore, Editor, at 773-2627 , or Fax to 773-9620. Deadline for submission is the 1st of the month preceding publication: e.g., Feb. 1 for the March issue. Digital or electronic submittals required. (e-mail: nwh@neosoft.com).	

GEOPHYSICAL SOCIETY OF HOUSTON

7171 HARWIN DRIVE, SUITE 314
HOUSTON, TEXAS 77036-2190
(713) 785-6403



ADDRESS CORRECTION REQUESTED

Second Class
U.S. Postage
PAID
Houston, Texas