



Geophysical Society of Houston

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NEWSLETTER

SEPTEMBER 1998

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**PLEASE REMEMBER
TO RETURN YOUR
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AND INFORMATION
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President's Letter

Bob Tatham, Texaco September, 1998

Welcome to the 1998-1999 season of the Geophysical Society of Houston. The year ahead will continue to bring many technical, networking social and professional activities to the entire geophysical community in the Houston area. In recent years, the society has expanded its educational and technical program in the areas of special interest groups and the Distinguished Lecture Series. On the professional front, registration of Professional Geophysicists continues to be an issue. And as for social activities, numerous events allow for pleasant and informal networking with our fellow geophysical professionals.

The center of the Technical Program is the monthly technical luncheon meetings held at the Houston Engineering and Scientific Society in the Galleria (Uptown) area. This program has been expanded to include technical breakfasts held in the Greenspoint and West Houston (Energy Corridor) areas. Perhaps the most popular technical programming is provided by our five Special Interest Groups (SIGs). The SIGs include Data Processing, Interpretation (including Interactive Workstations), Potential Fields, Environmental Applications and Reservoir Geophysics, meet either monthly or bi-monthly. These focused groups generally meet in the late afternoon or evenings at various locations around the city and allow for technical interactions in the various disciplines of our science. If you haven't been to a SIG meeting, I would encourage you to attend at least one during the year.

The Social Activities are as numerous and diverse as the Technical Activities. These include 'athletic' events of the Golf, Tennis, Sporting Clays and Bass tournaments, along with the fall Icebreaker social, the Shrimp Peel held jointly with the Houston Geological Society, and the ever popular annual awards banquet. The annual meeting, centered on the barbecue as well as the business events, concludes the season's activities.

The Continuing Education Program, coordinated with the SEG, includes the SEG courses offered in Houston as well as the annual GSH sponsored all-day symposium and the SEG Distinguished Lecture Series. This latter event is a new activity. This last year, Ian Jack offered in excellent one-day course on Time Lapse seismic. The upcoming year will feature Phil Schultz on Migration of Seismic Data. These courses, offered to GSH members at minimal cost, are becoming the most popular events of the society.

The monthly Newsletter not only provides brief articles of technical interest, but includes all of the programming of the GSH. It is an indispensable aid in planning monthly and technical activities of each GSH member.

Your officers are looking forward to a fruitful and productive year. The officers, however, are only a small part of the effort. The success of each and every event is dependent upon the many volunteers who make the GSH the success that it is. These volunteers

GEOPHYSICAL SOCIETY OF HOUSTON

Joan Henshaw, Office Manager • 7457 Harwin Drive, Suite 301 • Houston, Texas 77036 • (713) 785-6403 • (713) 785-0553

Office Hours 7 a.m. - 4 p.m.

Event Reservations Number: (713) 917-0218

email: reservations@hougeo.org • website - <http://www.seg.org/sections/gsh/gshhome.html>

GSH Board of Directors = GSH Executive Committee + SEG Section Representatives

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Employment Ref.	Sam LeRoy	556-9766	556-9778	earthview@aol.com
Finance	Joel Starr	781-4000	781-7858	joel@hstn.tensor.pgs.com
Office	David Forel	963-2493	963-2490	david.forel@waii.com
Volunteers	Open			
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Continuing Ed.	Dan Ebrum	713/954-6252	713/954-6911	ebromda@texaco.com
Speakers	John Sumner	966-6096	966-6326	John.R.Sumner@exxon.sprint.com
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Tech Luncheons	Phil Hosemann	655-9838	655-7301	hoseman@worldnet.alt.net
Tech Committee	Dave Agarwal	650-0325	650-3822	Dave0836@aol.com
Tech Transfer	David Forel	963-2493	963-2490	david.forel@waii.com
SIGS				
Data Processing	Karl Schleicher	713/782-1234		karl@geodev.com
Near Surf Geophysics ..	Tom Dobecki	281/679-5558		tdobecki@fugro.com
Interpretation	Randy Hoover	281/775-2761		
Potential Fields	Chuck Campbell	713/993-0671	713/960-1157	campbell@neosoft.com
Res. Geophysics	John Eastwood	966-3196	965-7309	john.eastwood@exxon.sprint.com
SEC. VP	Jock Drummond	281/873-3901	281/874-3470	jock_drummond@anadarko.com
Annual Meeting	Jim Moulden	281/293-5711		james.k.moulden@usa.conoco.com
Awards Banquet	Carmen Comis	713/393-4833	876-1359	carmen@double-precision.com
Golf Tournament	George Lauhoff	281/879-2223	713/963-2030	george.lauhoff@waii.com
Bass Tounament	Greg Doll	713/658-8096	951-0343	gqdoll@msn.com
Shrimp Peel	Tim Hartnett	713/961-8346	960-8400	Hartnett.Tim.T.@bhpc.com.au
Sporting Clays	Chris Tutt	713/689-2648	963-1928	chris.tutt@waii.com
Christmas Party	Lorinda Driskill	281/560-1104	281/560-1169	ldriskill@lgc.com
Tennis Tounament	Joe Jones	281/438-5626	682-6928	
SECRETARY	Ingrid Swendig	713/689-7865	713/689-7890	ingred.swendig@waii.com
Directory	David Forel	963-2493	963-2490	david.forel@waii.com
GSH Membership	Steve Starr		498-7008	498-0913 sstarr9711@aol.com
Ladies Auxiliary	Roshan Agarwal	281/890-4024	713/650-3822	Dave0836@aol.com
OTC Rep.	Alf Klaveness	713/468-5123	468-0900	
SEG Membership	Steve Starr	498-7008	498-0913	sstarr9711@aol.com
TREASURER	Steven Johnson	281/369-3647	281/366-5856	sjohnson@amoco.com
Student Loans	Don Ashabraner	669-372	669-3725	deashab@ppco.com
NEWSLETTER STAFF				
Editor	Jess Kozman	713/623-2481	713/621-9432	jkozman@seismicexchange.com
Assitant Editor	Elizabeth Fisher	281/597-1777	281/597-5377	eafisher@jasongoe.com
Company Contacts	Scott Sechrist	961-1804	961-9773	acoustic@neosoft.com
Electronic Pub.	Richard Verm	782-1234	782-1829	richard@goedev.com
Photography	John Freeland	423-7223	423-7801	
Publicity	Scott Sechrist	961-1804	961-9773	acoustic@neosoft.com
Company Store	Ingrid Swendig	713/689-7865	713/689-7890	ingred.swendig@waii.com
Training Notices	Lloyd Weathers	775-2453	775-4123	Lloyd_r_weathers@ccmepus.mobil.com
PAST PRES.	Bill Gafford	281/366-7873	fax 281/366-7569	wtgafford@amoco.com
PRIOR PAST PRES.	Wulf Massell*	713/650-3820	713/659-3735	wulf@epicgeo.com
SEG SECTION REPS*	Pat Peck	713/963-7801	713/963-7890	
	Lee Lawyer	531-5347	531-5347	ujhr40a@prodigy.com
	Brian Anderson	281/558-8383	281/558-8384	banderson@lct.com
	Jock Drummond	873-3901	873-1359	jock_drummond@anadarko.com
	Patrick Starich	423-7234	423-7917	Pjstarich@exxon.sprint.com
Alternate SEG Sec. Reps.	Pam Moore	512/231-8402	512/231-8728	PMoore@NewWorldHorizon.Com
	Alf Klaveness	468-5123	468-0900	
	Tom Fulton	464-1300	464-1615	
	Dave Agarwal	650-0325	650-3822	Dave0836@aol.com
	Cheryl Stevens			stevens@pakhome.khi.erum.com.pk

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Editor's Notes

Welcome to a new year of the Geophysical Society of Houston Newsletter. I am pleased both to have an opportunity to serve the membership of the GSH, and to be given the responsibility for ensuring communication with the profession that drives oil and gas exploration in Houston. I have always believed that no matter how much of our information transfer becomes electronic in nature, the process and art of creating the written word is still vital. I bring some experience to this post, having served as Managing Editor of the Dallas Geophysical and Geological Societies Newsletter at a time when the total combined circulation was about 1500, the same as the GSH's now. That was also the year that the publication began experimenting with a switch from typesetting to desktop publishing, and I spent some evenings actually pasting up camera ready copy, something I had not done since my days as a reporter for my high school newspaper. I am pleased to note that the GSH is fully electronic, and that my editorial job here consists mostly of collecting information e-mailed to me and sending it in digital form to the printer.

I would like to see this newsletter during my tenure provide timely information about events of interest to all of us and impetus for creative technical thought. As to the first, the best way to ensure that information is included is to provide it via e-mail to myself in accordance with the schedule included. For the second, I will attempt to include a technical note in each issue, short enough to be read in the time frame that we are nowadays allowed to peruse our mail, but hopefully of general enough interest to spark ideas and allow some healthy cross-fertilization across specializations. Our September luncheon speaker, Brian Russell, has provided such an item as the extended abstract for his talk, and it is included. I will be contacting our membership for submissions to continue this trend.

Current and back issues of this newsletter are available on the GSH

website in digital (.pdf) form at <http://www.seg.org/sections/gsh/gshnews.html> with full color illustrations. If you are part of the trend toward a paperless office you may elect to have your newsletter delivered in that same format via email by notifying me at jkozman@seismicexchange.com. We will provide electronic delivery as a supplement to U.S. Postal Service "dead-tree" version, and at the end of the publishing year will ask for feedback from those who participate about a full switch for those who are interested in the future. I look forward to an exciting and productive year.

Jess B. Kozman, 1998-99 editor.

GSH Newsletter Due Dates

Issue September 1998
Deadline July 16, 1998

Issue October 1998
Deadline August 20, 1998

Issue November 1998
Deadline Sept. 17, 1998

Issue December 1998
Deadline ... October 15, 1998

Issue January 1999
Deadline Nov. 19, 1998

Issue February 1999
Deadline Dec. 17, 1998

Issue March 1999
Deadline January 21, 1999

Issue April 1999
Deadline February 18, 1999

Issue May 1999
Deadline March 18, 1999

Issue June 1999
Deadline April 15, 1999

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provide the continuity and the physical work that make things happen. Being a volunteer also provides its rewards in camaraderie and the satisfaction of a 'job well done.' I encourage each of you to consider an area where you can make a difference, and then volunteer. On page two of this newsletter you will find the names of offices and committee chairs that will be planning the year's activities. Give one of them a call and get involved. Not only will you help the GSH, but you will also have fun. Geophysicists are a great group of people to work with, and I look forward to working with each of you during the upcoming year.

Technical Luncheon

Date: Tuesday,
September 22, 1998
Time: Register and Cash Bar
11:30 a.m.; Luncheon
and Talk 12:00 noon
Location: NewHESS Building,
5430 Westheimer
Formerly the Carlyle
Restaurant located on
the north side of
Westheimer between
Chimney rock and
Yorktown
Cost: \$20 for pre-registered
members; \$25 for
walk-ins and guests
Reservations: Call 713/917-0218
or Email:
reservations@hougeo.org
no later than Noon on
Friday, September 18,
1998

Speaker: Brian H. Russell

Biography - Brian H. Russell
Brian Russell, vice-president of
Hampson-Russell Software Ltd. is an
internationally known geophysicist
who is active in many areas of
geophysics.

Brian holds a BSc. in geophysics
from the University of Saskatchewan,

Technical Luncheon continued on page 4

Canada, and an MSc. in geophysics from the University of Durham, England. He started his career in 1976 at Chevron in Calgary as an exploration geophysicist, subsequently working for Chevron in Calgary and Houston on a wide variety of assignments. After a year with Teknica Resource Development as a senior explorationist, Brian joined Veritas Seismic as a research and training geophysicist, eventually becoming vice president of marketing and training for Veritas Software.

In 1987, Brian and Dan Hampson co-founded Hampson-Russell Software, a company specializing in the development of geophysical software. The company is based in Calgary, but has offices in Houston, London, and Hong Kong. In 1996, Brian and Dan received the SEG Enterprise award for their contributions in developing inversion and AVO technology.

Brian presents courses on new geophysical technology throughout the world for various organizations, including the SEG. He is also active in the SEG, having served as second vice president in 1994, Chairman of The Leading Edge editorial board in 1995, and Technical Chairman of the 1996 SEG Convention in Denver. He is president-elect of the SEG for the 1997-98 term, and will be president of the SEG during 1998-99. He is also a past-president of the Canadian SEG, and is registered as a professional geophysicist in the province of Alberta.

Well log prediction using attributes from 3C-3D seismic data

Brian Russell¹, Daniel Hampson¹, Todor Todorov^{*2}, and Robert Stewart²
 1-Hampson-Russell Software Services Ltd., 2-The CREWES Project, University of Calgary.

Summary

Deriving a theoretical relationship between a measured log property and a seismic attribute may be complicated and of limited applicability. Another approach that can be used to relate seismic values to rock properties is to

find and apply a statistical relationship. Using multi-regression analysis and neural networks, we derive such a statistical relationship at the well locations and then apply it to the seismic data, i.e. we generate pseudo logs at the trace locations.

In this study, a statistical relationship between the sonic velocity and several seismic attributes is determined at fourteen well locations in the Blackfoot area, Alberta. Cross-validation analysis is used to evaluate this relationship and it showed a prediction correlation of 0.85. A low-velocity anomaly from the generated pseudo velocity logs is interpreted as a sand channel.

Introduction

Deriving rock and reservoir properties from seismic data is a challenging task. A traditional approach is to look for a theoretical relationship between the physical parameter and some seismic attributes. For example, low impedance gas sands can cause anomalous impedance contrasts that lead to bright spots. However, the relationship between the physical parameter and the seismic attributes might not be obvious. To overcome the problem, we choose to derive a statistical, rather than deterministic relationship. (See Schultz et al., 1994, or Russell et al, 1997).

Methods

In general, the relationship (in the time domain) between the log property and the seismic attributes can be written in the following form:

$$P(x, y, t) = F[A_1(x, y, t), A_2(x, y, t), \dots, A_M(x, y, t)]$$

where $P(x, y, t)$ is the log property as a function of coordinates x, y, t , $F[\dots]$ is the functional relationship, and $A_i, i = 1, \dots, M$, denotes the seismic attributes.

The functional relationship can be found using linear multi-regression analysis. For N measured time samples from the logs (converted from depth to time), we have:

$$P_t = \frac{W_1 A_{1t} + W_2 A_{2t} + \dots + W_M A_{Mt} + W_{M+1}}{W_{M+1}}$$

where $t = 1, \dots, N$ denotes the time samples, and $W_i, i = 1, \dots, M + 1$ are weights. The weights are determined by least-squares optimization.

A more advanced approach is to use convolution operators instead of constant weights in the regression analysis:

$$P_t = W_1 * A_{1t} + W_2 * A_{2t} + \dots + W_M * A_{Mt} + W_{M+1}$$

where $*$ denotes convolution.

In a case of an L -point convolution operator there are $L \cdot M + 1$ unknown weights to be determined by least-squares optimization.

The above method will perform well if the functional relationship between the predicted log property and the seismic attributes is close to linear. In the case of a non-linear relationship, we may apply a non-linear transform to the seismic attributes prior to the least-squares optimization or use neural networks as a prediction tool. Figure 1 shows schematically the basic architecture of a multilayered back-propagation neural network.

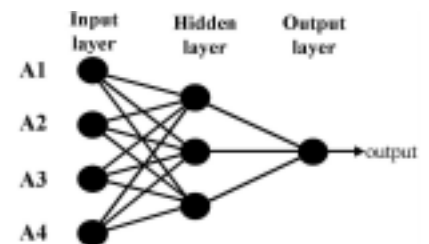


Figure 1. Basic neural network architecture. In this example, there are four input attributes, three neurons in the hidden layer and one log sample as an output.

The neural network consists of a set of neurons that are arranged into two or more layers. The neurons are connected in the following fashion: inputs to neurons in each layer come from outputs of previous layer, and outputs from these neurons are passed

Technical Luncheon continued from page 4

to neurons in the next layer. Each connection represents a weight. There is also a constant added at each neuron, as well as a non-linear activation function applied at the output of each neuron. The neural network is completely defined by the number of layers, neurons in each layer, and the connection weights. The process of weights estimation is called training. A training set is required and the weights are modified iteratively, so that the outputs of the network match closely the target outputs.

Blackfoot field example

As an example of the techniques described in the previous section, we present a case study involving prediction of sonic logs in the Blackfoot field, Alberta (Township 23, Range 23 W4M). A 3C-3D seismic survey was recorded in October, 1995, with the primary target being the Glauconitic member of the Mannville group (Lawton et al., 1997). The reservoir occurs at a depth of around 1550 m. (1060 ms), where Glauconitic sand and shale fill valleys incised into the regional Mannville stratigraphy. The objectives of the survey were to delineate the channel and distinguish between sand-fill and shale-fill. Well log analysis showed that the sand has a sonic velocity of 3800 m/s, while the shale has sonic velocity of 4200 - 4300 m/s.

Fourteen sonic logs from the area were tied with the seismic data and converted to time. A number of seismic attributes (Chen and Sidney, 1997) were extracted from the seismic volume. Before applying the method, we had to choose which seismic attributes to use in the analysis. One way to determine the best combination is to qualify the seismic attributes according to their linear correlation with the predicted property. However, if there is an inner linear relationship between some of the attributes, the chosen combination may not be the optimal. A better approach is to find the smallest RMS error between the known log and the predicted one from a particular combination of seismic

Attribute	RMS error (m/s)
Impedance	262.5
Integrated trace	213.7
Time	210.0
Instantaneous phase	206.4
Amplitude envelope	203.8
Amplitude weighted frequency	201.1
Amplitude weighted cosine phase	198.9
Integrated absolute amplitude	197.2
Instantaneous frequency	196.2
Derivative	195.4

Table 1.
Optimal 10-attribute combination. Adding a new attribute to the multi-regression analysis decreases the RMS error. The top six attributes are ultimately used in the analysis.

attributes. First the best single attribute is determined, i.e. the attribute with the smallest RMS prediction error - the impedance in this case. Then the impedance is paired with the rest of the attributes and the best pair is found - impedance plus the integrated trace. Then the best triplet is found (impedance, integrated trace, and time) and so on. Table 1 shows the optimal combination for 10 attributes using a 5-point convolution operator.

Note that the shown RMS error corresponds to a combination of the attribute with the ones above it.

Figure 2 is a plot of the average RMS prediction error as a function of the number of seismic attributes used in the multi-regression analysis. The lower line is the error using all wells in the calculation and the upper line is

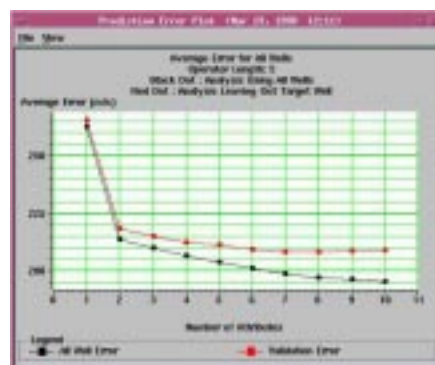


Figure 2.
Average RMS error as a function of the number of seismic attributes.

called the validation error. It is calculated by averaging the result of 'hiding' or not using a well and predicting its values using the others (cross-validation analysis). We see that adding attributes beyond the sixth one did not improve the validation error, so we choose to use the first six attributes.

Figure 3 shows the cross-validation test using the optimal 6-attribute combination at 01-08, 08-08, and 209-08 well locations. The curves are the recorded sonic log and the predicted one from the cross-validation analysis.

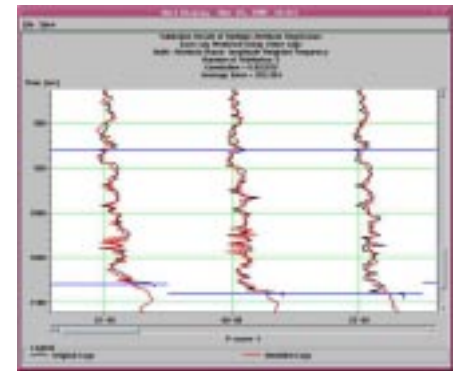


Figure 3.
Measured sonic logs and the predicted one from the cross-validation analysis. The correlation is 0.85.

The correlation between the real log and the predicted one is 0.85 and the cross-validation RMS error is 209 m/s. Neural networks are powerful prediction tools, but should be used with care. The main problem is overfitting of the training data set, which leads to poor prediction on unseen data. To overcome this problem, we divide our data into two data sets: training and testing. The first one is used to train the net and the second one to evaluate its performance. During the training the network builds a nonlinear mathematical model which later is applied to the seismic data to generate a predicted sonic velocity cube. The training is performed in the following fashion:

Technical Luncheon continued on page 6

Data	Correlation	RMS error	Records
All	0.88	169.5	1038
Train	0.89	164.1	726
Test	0.86	181.4	312

Table 2.

Results from the neural network training.

- Hidden neurons are added one at a time
- Training is performed and tested
- Construction is stopped when the correlation on the test data shows no further improvement

Table 1 shows the results from the training process using the same six attributes and a 5-point convolution operator. Figure 4 shows the recorded sonic logs, in black, and the predicted one, in red, at the 01-08, 08-08 and 209-08 well locations.

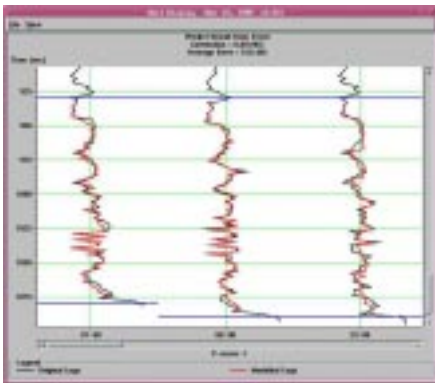


Figure 4.

Measured sonic logs and the predicted one from the neural network. The correlation is 0.88.

The derived relationship is applied to the seismic data set and a predicted sonic velocity cube is generated.

Figure 5 shows a cross-line a cross-line extracted from the cube. The low velocity anomaly at 1060 ms to 1090 ms is interpreted as a sand channel.

Conclusions

Multi-regression analysis and neural networks can be successfully used to predict log properties from seismic attributes. In the presented example, the cross-validation test showed high prediction correlation of 0.85 using multi-regression analysis and 0.88 using neural network as a

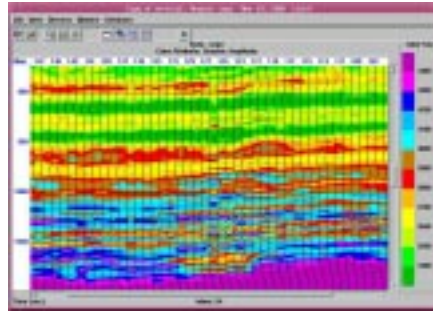


Figure 5.

Predicted sonic velocity from multi-regression analysis using 6 attributes and a 5-point convolution operator. The low velocity anomaly at 1060 ms to 1090 ms is interpreted as a sand channel.

prediction tool.

Current work

We are currently adding attributes derived from converted wave seismic data to the estimation process in an attempt to improve the prediction.

Acknowledgement

The authors would like to thank the CREWES project sponsors for their support.

References

Chen, Q., and Sidney, S., 1997, Seismic attribute technology for reservoir forecasting and monitoring: The Leading Edge, 16, No. 5.

Lawton, D., Stewart, R., Cordson, A., and Hrycak, S., 1996, Design review of the Blackfoot 3C-3D seismic program: The CREWES Project Research Report, 8.

Russell, B., Hampson, D., Schuelke, J., and Quierein, J., Multiattribute Seismic Analysis: The Leading Edge, 16, No.10

Schultz, P., Shuki, R., Hattori, M., and Corbett, C., 1994, Seismic-guided estimation of log properties, The Leading Edge, 13, No.5.

SIG Announcements

Near Surface SIG September Meeting

Date: Wednesday,
September 23, 1998
Time: 5:30 pm
Location: Fugro Building, Room
160, 6100 Hillcroft
(corner Hillcroft and
Gulfton)
Cost: None
Speaker: Dr. Mustafa Saribudak,
Environmental
Geophysics, Houston
Topic: "Integrated
Geophysical Studies at
a Refinery in Central
America"

Abstract

Integrated geophysical studies, including magnetics, ground conductivity (EM-31 and EM-34), and time-domain electromagnetic (TDEM) soundings were conducted at a refinery site in Central America. The purposes of this study were to: 1) delineate fault and fracture zones 2) detect and map lateral changes in conductivity (layer continuity) and 3) determine depth to volcanic bedrock and thickness of unconsolidated overburden.

A grid of four NS and five EW profiles were acquired using magnetics and ground conductivity. Based upon the results of these surveys and a review of available geologic information for the area, ten sites for TDEM soundings were selected.

The combined geophysical data set indicates that six fault zones may be present within the study area; four are oriented approximately NS and two are oriented approximately EW. These correlate well with faults identified from surface geologic mapping as well as photolines identified from aerial photographs. The inversion of the TDEM soundings, coupled with available borehole information, show that approximately 25 to 45 meters of volcanic sediments overlie volcanic andesite/basalt bedrock along the

Near Surface continued from page 6

south-central and southeast portions of the study area but that the volcanic bedrock is apparently absent (within the upper 150 meters) along the northeast part of the study area.

NOTE: The Near Surface SIG will strive to meet every other month for the coming year. All geoscientists are invited to our meetings and to make presentations or offer suggestions for meeting topics. Please contact the Near Surface SIG chair, Tom Dobecki, at 713-778-5505 (tdobecki@fugro.com).

POTENTIAL FIELDS GROUP

BI-MONTHLY MEETING

Date: Thursday, September 24, 1998
 Time: Social Hour, Dinner and Program at 5:30, 6:30 and 7:30 p.m. respectively
 Place: New HESS Building, 5430 Westheimer, formerly the Carlyle Restaurant. Located on the north side of Westheimer between Chimney Rock and Yorktown
 Cost: Still only \$20.00 (Payable to the GSH), No shows will be billed.
 Topic: Equivalent Source Interpolation
 Speaker: Richard Hansen, Pearson, DeRidder and Johnson, Inc.
 Reservation: RSVP by September 22 to: Chuck Campbell, ACCEL Services, Inc. campbell@neosoft.com, or 713-993-0671

Abstract:

Image displays are increasingly popular in potential field data interpretation. Unfortunately, such

displays emphasize minor data errors such as line-to-line level shifts and make them very distracting. The level shifts can be removed by operations such as decorrugation, but these operations also remove useful geologic information from the data.

Many of the level shifts between lines on an aeromagnetic map are due to elevation differences between adjacent lines, particularly in areas of rugged topography. These effects can be removed completely by interpolation using a set of equivalent sources, which are calculated taking into account the elevation of each data point. The equivalent source layer can then be used to compute an interpolated field at any desired elevation.

As an added bonus, the equivalent source layer can be used for further interpretive processing, such as upward and downward continuation or reduction to the pole.

Biography:

Richard Hansen has more than 15 years of experience in developing algorithms for processing and interpreting potential field data. Prior to taking his current position as Chief Geophysicist at Pearson, DeRidder and Johnson, Inc., he was Director of the Gravity and Magnetics Project at the Colorado School of Mines. There, he and his students worked on leading-edge applications of gravity and magnetic methods to oil exploration, including interactive integrated interpretation of gravity, seismic and well log data, application of Wiener filters in anomaly separation, and a multi-body 3D magnetic inversion algorithm.

Before joining the Colorado School of Mines, Dr. Hansen was Staff Scientist at E&G Geometrics. In that capacity, he participated in the Curie depth interpretation of Japan for the New Energy Development Organization, the development of a marine magnetic gradiometer processing system, and the application of a horizontal airborne magnetic gradiometer to oil and mineral exploration. Dr. Hansen received his

Ph.D. in Physics from the University of Chicago in 1973. He has served three terms as Associate Editor for Geophysics.

Reservoir Geophysics

Session/Seminar

Date: Saturday, September 12, 1998
 Time: 1:30 pm to 5:00 pm
 Location: Geoscience Building, University of Houston Call UH Professor Zhou, Huawei (281-565-8343) if you need more directions.
 Cost: \$10 admission fee per person
 Theme: Advances in Reservoir Geophysics

Related event:

The 50-person delegation from China petroleum industry and institutes for 1998 New Orleans SEG Convention will visit Houston during September 6-13, 1998. The Chinese Association of Professionals in Science and Technology (CAPST) will host an East-meet-West Symposium on September 12, 1998 for the delegation. The symposium includes a morning general session with keynote speakers professors Robert Sheriff and Amos Nur, and afternoon sessions in particular, the Reservoir Geophysics Session co-sponsored by the Reservoir Geophysics SIG of GSH. For more information about the symposium, please contact Dr. Quincy Chen, the symposium chairman and Reservoir Geophysics SIG coordinator.

Session coordinators:

Dr. Tang, Xiaoming Western Atlas Logging Services
 Dr. Liu, Xingzhou Texaco EPTD

Session speakers:

8 speakers are being arranged

Reservoir Geophysics continued on page 8

Reservoir Geophysics continued from page 7

Session topics:

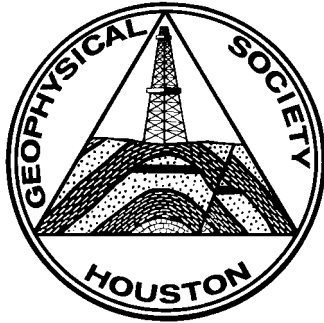
Thin-layer reservoir, Multiple attribute analysis, Dynamic reservoir characterization, Reservoir EM-seismic modeling and monitoring, Fractured reservoir, China case studies.

Contact:

Dr. Tang, Xiaoming (713-972-6592)

Dr. Liu, Xingzhou (713-954-6238)

Dr. Quincy Chen (713-689-5778, quincy.chen@waii.com)

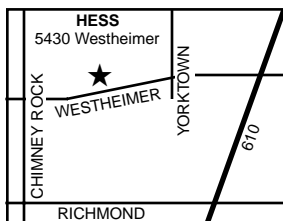


GSH ICEBREAKER

Come and join your friends and fellow members to welcome the '98/'99 Technical Program, and celebrate our industry's revival.

DATE: Wednesday, September 9, 1998
 TIME: 5:00 - 8:00 P.M.
 PLACE: HESS • 5430 Westheimer
 (The old "Carlyle" next to the Bechtel Building)
 COST: \$10.00 (plus cash Bar)
 RESERVATIONS: Please either

- 1) Fax your info. including member number to (713) 785-0553
- 2) Call Joan @ office (713) 785-6403 or
- 3) Call Reservation line (713)-917-0218 by Friday, September 5 @ 1:00pm



A letter to the GSH membership in memory of Frank Hersey:

I first met Frank in the year 1979, when I started working at Sefel Geophysical. A year later, he opened his own company, GeoCenter Inc. I joined Frank at GeoCenter in June 1980. Frank and I worked together for more than eighteen years. He was my teacher, my mentor, and my role model. I learned and gained tremendous amount of knowledge about geophysical data processing. Frank was very competitive, smart, and full of humor. There was nothing he could not do if he put his mind to it. His favorite phrase was, " IF I COULD DO THIS IN 19.....72, WHY CAN'T WE DO IT NOW ". I will miss him greatly and cherish his memories for the rest of my life. Frank! You were my inspiration man !!!!!!!

I will miss you man !!!!!!!

Sukhdev Hyare
 GeoCenter

Upcoming Events:

Shrimp Peel
October 9

Tennis Tournament
October 16

Deepwater Technologies Conference
October 19-20
(508) 481-6400

<http://www.ibcusa.com/conf/deepwater>

Holiday Buffet Luncheon
December 15

Send all Upcoming Event notices to:

Jess Kozman
713/623-2481 • Fax: 713/621-9432
Email: jkozman@seismicexchange.com

HGS/GSH Shrimp Peel

Friday, October 9, 1998 • 5:00 p.m until 9:00 p.m

SAINT ARNOLD™

BREWING COMPANY

Houston's First Microbrewery
2522 Fairway Park Drive

Tickets \$15.00 advance / \$25.00 at the door (tickets may not be available at the door)

Event limited to 750 persons only, so purchase tickets early.

Make checks payable to GSH

Advance purchase by mail until **Friday, October 2, 1998**

HGS/GSH Office • 7457 Harwin, Suite 301 • Houston, Texas 77036

(Enclose a self-addressed, stamped envelope)

Advance purchase in person until **Wednesday, October 7, 1998**

NO MINORS PLEASE

Southwest

Joan Henshaw

HGS/GSH Office

7457 Harwin, Suite 301

(713) 785-6402/6403

North

Rachel White

Mobil E&P US

1250 Greenspoint Drive

(281) 775-2000

Downtown

Cheryl Stevens

EPIC Geophysical

1331 Lamar, Suite 131

(713) 650-3820

Galleria

Julie Hardie

Seismic Exchange, Inc.

1776 Yorktown, Suite 500

(713) 623-8300

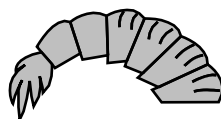
West

Sarah Murphy

LCT, Inc.

1155 Dairy Ashford, Suite 500

(281) 558-8383



Event Chairpersons

Joe Parker

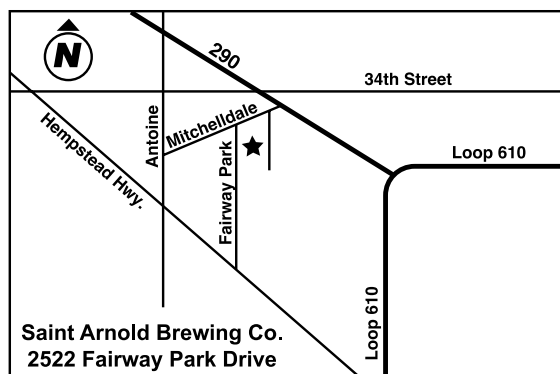
Geco-Prakla

(281) 596-6149

Tim Hartnett

BHP Petroleum

(713) 961-8346



Refreshments

Music

Dancing

GEOPHYSICAL SOCIETY OF HOUSTON



13th ANNUAL SPORTING CLAYS TOURNAMENT

**Saturday
September 12,
1998**

The 13th Annual Shooting Clays Tournament will be held on September 12 at the American Shooting Centers. Come on out and try the passing dove and springing teal, goose tower and other challenging shots. The tournament will be an all day event and family participation is encouraged.

The tournament will be a 50 bird event and participants will shoot in groups of five (5). Participation is limited to 200 shooters, and due to the Labor Day Weekend, the sign-up deadline will be extended to September 4. Shells, BBQ lunch and refreshments will be provided. Please bring eye and ear protection.

To enter, complete the form below and mail along with a check payable to: Geophysical Society of Houston

**Mail to: c/o Western Geophysical • P.O. Box 2469 • Houston, Texas 77252-2469
Attn.: Chris Tutt
(713) 689-2648 • Fax: (713) 689-2689**

**GEOPHYSICAL SOCIETY OF HOUSTON
13th ANNUAL SPORTING CLAYS TOURNAMENT
SEPTEMBER 12, 1998**

NAME: _____ TEL: (RES) _____ (WRK) _____

ADDRESS: _____ COMPANY: _____

**PREFERRED SHOOTING TIME: (circle one) 8:00 9:45 11:30 1:15
— Please arrive 30 minutes before shooting time —**

SHOOTING GROUP (including self)

- 1. Mr. Ms. _____ 12/20
- 2. Mr. Ms. _____ 12/20
- 3. Mr. Ms. _____ 12/20
- 4. Mr. Ms. _____ 12/20
- 5. Mr. Ms. _____ 12/20

(CIRCLE GUN TYPE)

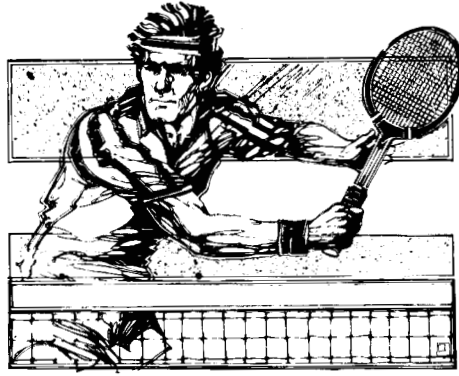


GSH/HGS Members or Guest \$58.00

DISCLAIMER:

I acknowledge that neither the Geophysical Society of Houston nor the American Shooting Centers will be held responsible for any injury or accidents during this event. **PRACTICE SAFETY!!**

NAME: _____ GUEST: _____



1998 GSH TENNIS TOURNAMENT

Friday, October 16, 1998 • 12:00 noon
Chancellors Tennis Club
\$30.00 per person

Play will begin promptly at 1:00 p.m. and conclude by 5:00 p.m. Lunch will begin serving at 12:00 p.m. and as usual it will be GREAT. Cold drinks will be available and a Keg will be available during the COOLING DOWN TIME. This will be a one half day A and B Scramble Tournament. A player will play with all other players in his group. Ladies will be teamed with partners in the A or B Groups as they choose. In addition to TROPHIES, there will be a drawing for a generous group of DOOR PRIZES. To ensure the proper amount of court space, food and drinks, complete and send in the entry form as soon as possible, but no later than October 12, 1998. We need more players and encourage you to get your associates to participate in this tournament. We are inviting players in the Geological Society to join us this year so as to have more players and more FUN. For information call Bill Steiner 713/789-7250 or Joe Jones 281/438-5626.

1998 GSH TENNIS TOURNAMENT ENTRY FORM

Name: _____

Company: _____

Phone Number: _____

Flight preferred: A _____ B _____ Ladies _____

Make check payable to: GSH Tennis Tournament

Mail to: JOE JONES • 3802 Pecan Valley Drive • Missouri City, Texas 77459-4441

NORTH HARRIS COLLEGE
GEOSCIENCE TECHNOLOGY TRAINING CENTER

FALL 1998 COURSE SCHEDULE

SEPTEMBER

WORKSTATION INTERPRETATION: SEISMIC MICRO TECHNOLOGY 24 hours

Students will utilize 2D/3D PAK seismic interpretation software to interpret a seismic data set on PC's. Students will interpret faults, horizons, create time slices, polygons, create various vertical seismic displays, and manipulate colors using a variety of workstation viewing options and utility functions.

CGTTC 2E171 ND011 TTH 9/8-9/24 6:00-10:00 PM DISTRICT 209

COMPUTER WORKSTATION MODELING: AVO 24 hours

This course deals with the analysis of Amplitude Variations with Offset (AVO) and post-stack amplitude inversion. Topics will include seismic data processing and displays, forward modeling using well log data, synthetic models, and model-based inversion methods utilizing well logs and NMO velocities, and seismic trace attribute extraction.

CGTTC 2B021 ND001 WTHF 9/9-9/11 8:00 a.m. - 5:00 p.m. DISTRICT 208

WORKSTATION INTERPRETATION: SEISWORKS 24 hours

Students will utilize a UNIX workstation, LANDMARK SeisWorks and 3D seismic data to interpret faults and horizons, create time slices, and contour maps using a variety of workstation viewing options and utility functions.

CGTTC 2E151 ND008 S 9/12-9/26 8:00 a.m. - 5:00 p.m. DISTRICT 208

AN INTRODUCTION TO ORACLE 24 hours

This class is designed to introduce students to the ORACLE database administrator, and is the first in a series of three ORACLE courses. Topics will include client/server computing, networking and related issues, SQL, and PL/SQL.

CGTTC 2F021 ND002 S 9/12-9/26 8:00 a.m. - 5:00 p.m. DISTRICT 209

GEOPHYSICAL DATA LOADING: GEOQUEST FORMAT 24 hours

This course will cover the basic methods for loading 2D and 3D seismic data from tape into a project or projects created to receive these data sets. This course will discuss seismic tape formats, quality checking data, scaling and clipping data for the final load, bit integers, time slice generation, and other topics relevant to 2D and 3D seismic data loading. GeoQuest format.

CGTTC 2L061 ND014 MW 9/14-9/30 6:00 p.m. - 10:00 p.m. DISTRICT 208

WORKSTATION: GEOGRAPHIX 24 hours

Students will utilize GeoGraphix Interpretation software to interpret a seismic data set on PC's. Students will interpret faults, horizons, create time slices, polygons, create various vertical seismic displays, and manipulate colors using a variety of workstation viewing options and utility functions.

CGTTC 2M021 ND015 MW 9/14-9/30 6:00 p.m.-10:00 p.m. DISTRICT 209

UNIX FOR THE WORKSTATION SCIENTIST 24 hours

Introduction to the use of UNIX as a tool for workstation manipulation and improved project management. Topics include basic Unix architecture and concepts of shells, file systems, directory paths, and client/server relationships in addition to basic UNIX commands. Experience with keyboard and "mouse" manipulation recommended. This is NOT UNIX for dummies.

CGTTC 2D051 ND001 MW 9/21-10/14 6:30 p.m. - 9:30 p.m. DISTRICT 207

GEOLOGICAL INTERPRETATION: STRATWORKS

24 hours

This course deals with the interpretation of geological data using a UNIX workstation. topics will include the use of well logs and log correlation, construction of cross-sections, mapping of geological data, horizon interpretation, and map editing.

CGTTC 2E121 ND004 TWTh 9/22-9/24 8:00 a.m.- 5:00 p.m. DISTRICT 208

OCTOBER**GEOGRAPH INFORMATION SYSTEMS I**

24 hours

This course discusses cartographic techniques and explores the use of GIS on a personal computer. It will cover the basics of what GIS is and what it can accomplish. GIS has technological applications in the petroleum industry, environmental sciences, city and utility planning, and sales and marketing analysis.

CGTTC 2C071 ND003 TTH 10/6-10/22 6:00 p.m. - 10:00 p.m. DISTRICT 209

WORKSTATION INTERPRETATION: SEISWORKS

24 hours

Students will utilize a UNIX workstation, LANDMARK SeisWorks and 3D seismic data to interpret faults and horizons, create time slices, and contour maps using a variety of workstation viewing options and utility functions.

CGTTC 2E151 ND009 TWTH 10/6-10/8 8:00 a.m. - 5:00 p.m. DISTRICT 208

WORKSTATION INTERPRETATION: SEISMIC MICRO TECHNOLOGY 24 hours

Students will utilize 2d/3dPAK seismic interpretation software to interpret a seismic data set on PC's. Students will interpret faults, horizons, create time slices, polygons, create various vertical seismic displays, and manipulate colors using a variety of workstation viewing options and utility functions.

CGTTC 2E171 ND012 S 10/10-10/24 8:00 a.m. - 5:00 p.m. DISTRICT 209

WORKSTATION INTERPRETATION: GEOQUEST

24 hours

Students will utilize a UNIX workstation, GEOQUEST IEX-IESX and 3D seismic data to interpret faults and horizons, create time slices, and contour maps using a variety of workstation viewing options and utility functions.

CGTTC 2E131 ND006 S 10/17-10/31 8:00 a.m. - 5:00 p.m. DISTRICT 208

AN INTRODUCTION TO UNIX-BASED SYSTEMS ADMINISTRATION

24 hours

This introductory course will discuss UNIX-based workstation systems administration from the viewpoint of the systems administrator. System maintenance, data base administration and storage, backup and restoration procedures, networking, space allocation, and security are some of the topics to be addressed by this course.

CGTTC 2D042 ND001 M 10/19-11/23 6:00 p.m. - 10:00 p.m. DISTRICT 208

GEOLOGICAL INTERPRETATION: ADVANCED STRATWORKS

24 hours

This course continues the geologic interpretation of well data using a UNIX workstation. Topics include graphic well log correlation; construction and editing of cross-sections; gridding, contouring and editing of maps; single and multi-well displays; and lithology computation and display on well logs and maps. Editing surface grid profiles using Seismic Backdrop and employing bubble maps to study production trends will also be covered.

CGTTC 2E032 ND005 TWTH 10/27-10/29 8:00 a.m. - 5:00 p.m. DISTRICT 208

NOVEMBER**WORKSTATION INTERPRETATION: SEISMIC MICRO TECHNOLOGY 24 hours**

Students will utilize 2D/3D PAK seismic interpretation software to interpret a seismic data set on PC's. Students will interpret faults, horizons, create time slices, polygons, create various vertical seismic displays, and manipulate colors using a variety of workstation viewing options and utility functions.

CGTTC 2E171 ND013 MW 11/2-11/18 6:00 p.m. - 10:00 p.m. DISTRICT 209

COMPUTER WORKSTATION MODELING: AVO 24 hours

This course deals with the analysis of Amplitude Variations with Offset (AVO) and post-stack amplitude inversion. Topics will include seismic data processing and displays, forward modeling using well log data, synthetic models, and model-based inversion methods utilizing well logs and NMO velocities, and seismic trace attribute extraction.

CGTTC 2B021 ND002 S 11/7-11/21 8:00 a.m. - 5:00 p.m. DISTRICT 208

ORACLE ADMINISTRATION II 24 hours

This course is designed to further the techniques acquired in Oracle Introduction and Oracle Database Administration on a more advanced level.

CGTTC 2F043 ND003 S 11/7-11/21 8:00 a.m. - 5:00 p.m. DISTRICT 209

GEOGRAPHIC EXPLORATION SYSTEM (GES) 24 hours

GeoGraphix Exploration System (GES) uses geographic information systems technology to produce an integrated mapping program for geoscience modeling. GES provides a spatial and relational database for data management and mapping. It consists of a series of modules: Presentation, LandNet, WellBase, SeisMap and IsoMap to provide a complete mapping database management and interpretation package.

CGTTC 2M031 ND017 S 11/7-11/21 8:00 a.m. - 5:00 p.m. DISTRICT 209

WORKSTATION INTERPRETATION: GEOQUEST 24 hours

Students will utilize a UNIX workstation, GEOQUEST IEX-IESX and 3D seismic data to interpret faults and horizons, create time slices, and contour maps using a variety of workstation viewing options and utility functions.

CGTTC 2E131 ND007 TWTW 11/10-11/12 8:00 a.m. - 5:00 p.m. DISTRICT 208

X-WINDOWS, INTRODUCTION 24 hours

This course is an introduction to the usage of the UNIX-based X-Windows System and its structure. Starting and exiting X, basic procedures and problems, differences and similarities of such window management systems as Motif and OpenLook, effective use of the xterm window, and other related topics will be discussed. Some basic knowledge of UNIX is required.

CGTTC 2D052 ND002 MW 11/23-12/16 6:30 p.m.- 9:30 p.m. DISTRICT 207

GEOGRAPHIC EXPLORATION SYSTEM (GES) 24 hours

GeoGraphix Exploration System (GES) uses geographic information systems technology to produce an integrated mapping program for geoscience modeling. GES provides a spatial and relational database for data management and mapping. It consists of a series of modules: Presentation, LandNet, WellBase, SeisMap and IsoMap to provide a complete mapping database management and interpretation package.

CGTTC 2M031 ND018 MTW 11/30-12/9 6:00 p.m. - 10:00 p.m. DISTRICT 209

DECEMBER**WORKSTATION INTERPRETATION: Z-MAP PLUS**

24 hours

This course will utilize ZYCOR software to explore the mapping of geophysical and geological data on a computer workstation. It will cover mapping coordinate systems, projection types, importing of data files, gridding, Base map generation, contouring, editing and display techniques.

CGTTC 2E161 ND010 TWTH 12/1-12/3 8:00 a.m. - 5:00 p.m. DISTRICT 208

(Fee for all 24-hour courses is \$320.00)

(Fee for 16-hour course is \$215.00)

ACADEMIC COURSE**COMPUTER APPLICATIONS IN GEOLOGY**

4 hours

A semester-long workstation interpretation course featuring four weeks of UNIX, six weeks of GeoQuest IESX, and six weeks of Landmark SeisWorks geophysical interpretation. Students learn basic UNIX commands and syntax. Students will also interpret two 3D seismic prospects while learning the basic interpretation components of Landmark Graphic and GeoQuest interpretation software. Evaluation is in the form of a written UNIX exam and interpretation skills tests.

GEOL 2404 12001 T/TH Fall 98/Spring 99 6:00 p.m. - 8:50 p.m. DISTRICT 208

FOR INFORMATION ON:

REGISTRATION and GENERAL COURSE INFORMATION:

Community Education Registration Desk: 281-618-5600

Fax: 281-618-5633

COURSE CONTENT or INSTRUCTIONAL SOFTWARE please contact:

Sarah G. Stanley, Coordinator

Geoscience Technology Training Center, North Harris College

District Office

250 North Sam Houston Parkway East

Suite 204

Houston, Texas 77060-2000

Telephone: 281-260-3157

Fax: 281-260-3159

CHECK OUR WEB PAGE

<http://wwwnhc.nhmccd.cc.tx.us/admin/index.html>

Of Course You Can!

The North Harris Community College District provides equal employment, admission and educational opportunities without regard to race, color, religion, national origin, sex, age, or disability.

SEPTEMBER 1998

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
		1	2	3	4	5
6	7	8	9 Icebreaker	10	11	12 Reservoir Geophysics Seminar Sporting Clays
13 SEG New Orleans	14	15	16	17 SEG New Orleans NEWSLETTER DEADLINE	18	19
20	21	22 Technical Luncheon	23 Near Surface SIG	24 Potential Fields SIG	25	26
27	28 GIS for Oil & Gas Industry Conference (303) 337-0513 http://www.gita.org	29 GIS for Oil & Gas Industry Conference (303) 337-0513 http://www.gita.org	30 GIS for Oil & Gas Industry Conference (303) 337-0513 http://www.gita.org	31		

GEOPHYSICAL SOCIETY OF HOUSTON

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