## **BULLETIN**

## Corpus Christi Geological Society



and

## Coastal Bend Geophysical Society



March 2015 ISSN 0739 5620

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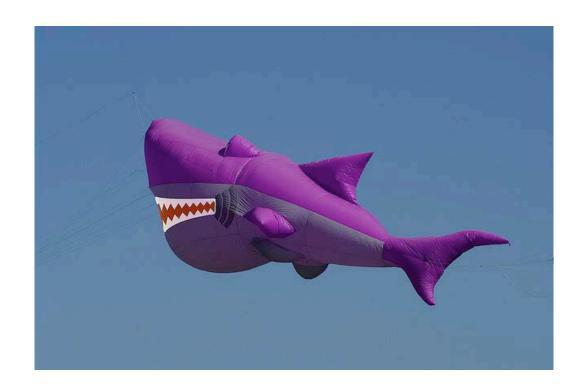
## Visit the geological Web site at www.ccgeo.org

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## \*\*\*BLOOD DRIVE\*\*\*

## THE BLOODMOBILE – IN MARCH- 2015 WILL BE AT SOME CONVENIENT LOCATIONS PLEASE CALL 855-4943 for those locations or see below:



## GO FLY A KITE - AFTER YOU <u>DONATE YOUR BLOOD!</u> HAPPY WINDY MARCH!

ATTENTION!!!
When you give blood: They have us listed as C.C. Geological
Society. Our number with them is 4254 & it would be helpful if you
can please give them that number also.
Thanks! Mike Lucent
** ***

www.coastalbendbloodcenter.com

#### CCGS/CBGS JOINT MEETING SCHEDULE 2014-2015

	September						October						November							
S	M	T	W	Th	F	S	S	M	T	W	Th	F	S	S	M	T	W	Th	F	S
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14	15	16	17	18	19	20	12	13	14	<u>15</u>	16	17	18	9	10	11	12	13	14	15
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28	29	30					26	27	28	29	30	31		23 30		25	26	27	28	29

Sept. 10, 2014 5:30p.m.—8:30p.m. Kickoff BBQ Howard's BBQ & Catering 1002 Antelope Street Oct. 15—11:30a.m.—1:00p.m. Speaker: Ken Williams— Halliburton. "Barostratigraphy" Nov. 19—11:30a.m.—1:00p.m. Speaker: Tony Hauglum--Rivera Exploration. "Eagleford Update"

		D	ecem	ber			January								F	ebrua	ry			
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21	22	23	24	25	26	27	18	19	20	<b>21</b>	22	23	24	22	23	24	25	26	27	28
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28	29	30	31				25	26	27	28	29	30	31							

Dec. 10—11:30a.m.--1:00p.m. Speaker: Woodson Godfrey— PaleoSource. "Distinguishing a Resource Play Jan. 21--11:30a.m.—1:00p.m. Speaker: Lei Zhang— Schlumberger. "Seismic Inversion to Reservoir Simulation" Feb. 18—11:30a.m.—1:00p.m. Speaker: Collegiate Month. "Presentation by TAMUCC, TAMUK and DelMar"

#### CCGS/CBGS JOINT MEETING SCHEDULE 2014-2015

		]	Marc	h						April	l,						May			
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22	23	24	25	26	27	28	19	20	21	22	23	24	25	17	18	19	<u>20</u>	21	22	23
29	30	31					26	27	28	29	30			24	25	26	27	28	29	30
														31						

March 11—11:30a.m.—1:00p.m. April 15—11:30a.m.—1:00p.m. Speaker: Fred Hilterman "Seismic Attribute analysis for the Gulf of Mexico"

Speaker: Richard Adams—Carr Resources. The Lower Woodbine Organic Shale of Burlenson and Brazos Counties, Texas: Anatomy of a New "Old" Play

Distinguished Speaker--Mark Papa

#### **Calendar of Meetings and Events Calendar of Area Monthly Meetings**

Corpus Christi Geological/Geophysical SocietySIPES Corpus Christi Luncheons	
South Texas Geological Society Luncheons	Second Wed—noon San Antonio
San Antonio Geophysical Society Meetings	
Austin Geological Society	
Austin Chapter of SIPES	· · · · · · · · · · · · · · · · · · ·
Houston Geological Society Luncheons	Last Wednesday
Central Texas Section of Society of Mining, Metallurgy & Exp	2 <sup>nd</sup> Tues every other month
	In San Antonio

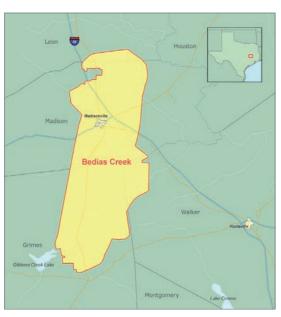


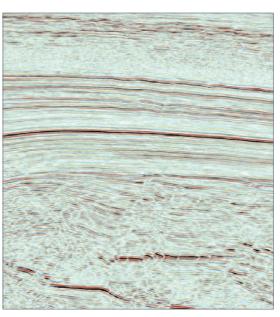




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#### **CCGS PRESIDENT'S LETTER**

Spring is here. Well, not officially. The true first day of spring is March 20th, but the weather down here in Corpus Christi is spectacular. That is not the case for our friends living in the North East. My wife and I have relatives in Michigan, and I can report that Mother Nature has not been nice to them. Record low temperatures, and the word is its going to get colder. If it stays that way much longer I may have some company.

The luncheon speaker for this month is Fred Hilterman. Please join us <u>March 11<sup>th</sup></u> for Fred's talk on Seismic Attribute Analysis for the Gulf of Mexico. I have seen him speak multiple times, and it is always a treat. Very entertaining and informative. Sara Davis with Seismic Ventures has kindly agreed to sponsor the luncheon bar and Pint Night. Please come out and join us Tuesday, March 10<sup>th</sup> at 5:30 for our monthly happy hour.

Collegiate month was a huge success! I really enjoyed hearing from our local colleges, and thanks to a few dedicated society members we pulled it off without a hitch. Thank you to Roger Steinberg (Del Mar College), Dr. Tania Anders (TAMUCC), and Dr. Mark T. Ford (TAMUK) for their time and effort putting together some wonderful presentations.

The NAPE experience this year was interesting to say the least. The range of attitudes regarding the state of our industry was astonishing. Driving home this year and reflecting on the previous 48 hours led me to one thought. The most successful people I ran into at the convention never mentioned the current commodity prices, rig rates, or storage numbers. Most of them simply asked me how I was doing. How old are your kids now? That sort of thing. Business as usual. What a great lesson.

Just a few reminders. The CCGS will be sending out nomination forms for officers via email here in the next week or so. Please be involved in the process. Also, we have a new website (same web address). Please check it out. Let me know what you think. I would love your opinions. This is *your* website. The CCGS is *your* society.

Leighton Devine

**CCGS** President



## Actively Seeking High Quality Drilling Prospects

#### Contacts:

Mike Layman (Geophysicist) 361-844-6922 Tom Winn (Geologist) 361-844-6992 Southern Winn (Geologist) 361-844-6998

> 800 North Shoreline Blvd. 19th Floor, North Tower Corpus Christi, Texas 78401

Office: 361-844-6900 Fax: 361-844-6901



Operating in South Texas and Gulf Coast since 1961 Contact: Mike Bullard P.O. Box 1011 Kingsville, Texas 78364 361-221-9717 Email:md\_bullard@sbcglobal.net





#### CBGS PRESIDENT'S LETTER

<u>News</u> - Oil prices stopped the drop at about \$45? Seismic crews, rigs and permits are falling.

A good summary of some new stuff from the SEG Convention is at the following. Offshore Magazine Geophysical News

#### **Business** -

CBGS needs a couple of volunteers. Bob Witherspoon is taking another position in Oklahoma City and has resigned as VP. Vicki Martlett has also moved on and has left the Education Chairman role open. It would be great to replace both. The VP role can be molded to fit the interested individual but is primarily a back up/advisor role for myself and Matt Hammer (Sec/Treasurer). The VP role for CBGS does NOT have to identify/organize speakers(but can if the individual wants too!!!!). The Education Chairman will work with myself and members to identify, organize and conduct at least one education seminar during the year. Both these roles take little time and it keeps you connected with the geophysical community. Let me know if you are interested.

#### Education -

- GSH - Webinar: An Introduction to Velocity Model Building Speaker: Dr. Ian F. Jones (Mention CBGS when you register)

Mon 13-Apr-215 to Thurs 16-Apr-2015, 8:00 a.m. 12:00 pm - New virtual course on Seismic Modeling, migration and velocity analysis.

- New SEG Virtual Course <u>Seismic Characterization of Organic Richness for Shale Reservoirs List Price</u>: \$ 50.00, Member Price \$40.00.
- SEG has 450+ eLearning courses online from \$0.99 to \$150.00(most expensive I saw)

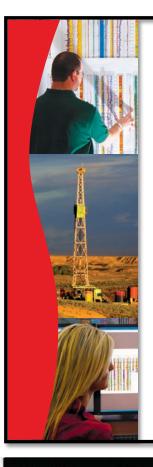
http://www.seg.org/professional-development/seg-on-demand

<u>Parting Thought</u> - An expert is a man who tells you a simple thing in a confused way in such a fashion as to make you think the confusion is your own fault. by William Castle

#### **Monthly O&G Statistics**

			-111	(n (n )   1   1   1   1   1   1   1   1   1
Seismic Crews - US Onshore	Current Month	Last Month	Difference	(Per SEG/Seismic Crew Reports Survey)
	Onshore/Offshore	Onshore/Offshore		
	45/19	44/21	-1	Dec (-19 crews worldwide)
	Current Month	Last Month	Last Year - Monthly	(Per Texas RRC, last reported)
Texas Production	MMBO/BCF	MMBO/BCF	MMBO/BCF	
Oil	74.9	74.8	66.7	Oct
Gas	675	669	705	
	Current Month	Yr to date - 2014	Yr to date - 2013	Nov
Texas Drilling Permits	1,506	25,792	21,471	
Oil wells	425	7,510	6,717	
Gas wells	92	1,434	1,290	
Oil and Gas wells	922	15,748	12,581	
Other	13	197	203	
Total Completions	1,797	27,478	23,073	Dec
Oil Completions	1,559	24,999	19,249	Ĭ
Gas Completions	353	3,585	4,917	
New Field Discoveries	3	45	53	
Other	47	970	756	

Lonnie Blake-CBGS President



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Results

## 2015 Annual Shrimp Boil

## Dewey's Beer Garden

On the back deck 2302 Rodd Field Road (between Holly and Saratoga)

Thursday, March 26, 2015
Starting at 5:30
Boiled Shrimp or Grilled Chicken
and all the fixin's!

RSVP by Monday March 23 - \$30.00 in advance (Money will not be taken at the door)
Please send completed form and payment (check payable to EA) to:
Dawn Bissell ~ 253 Circle Dr. ~
Corpus Christi, TX 78411

Corpus Christi Geological Society, Coastal Bend Geophysical Society, and Corpus Christi Energy Auxiliary

Please list the names of all those attending chicken or shrimp plates. All plates \$30.	g in your group, and the number of
Names:	
	Chicken Plates
	Shrimp Plates
	<u>\$</u>
	check number
	payable to EA

#### Corpus Christi Geological Society & Coastal Bend Geophysical Society

#### **LUNCHEON MEETING ANNOUNCEMENT**

### Wednesday, March 11, 2015

**Location:** Corpus Christi Town Club, 6<sup>th</sup> Floor (800 North Shoreline)

Student Sponsor: Core Lab (Juan Cabasos) and the CCGS

Time: 11:30 a.m. Bar, Lunch follows at 11:45 a.m., Speaker at Noon.

**Cost:** \$25 (a \$3 surcharge if no reservation). No-shows will be billed.

**Bar:** Sponsor: Sara Davis, Seismic Ventures

**Reservations:** Please by Monday before – email allison@aaoperating.com

## Luncheon Topic: Seismic Attribute Analysis of the Gulf of Mexico Presented by: Fred Hilterman

The fluid factor ( $\Delta F$ ), Poisson impedance (PI), and lambda-rho ( $\lambda \rho$ ) are three seismic attributes commonly used to predict pore fluid and lithology. The pore-fluid sensitivity of these attributes was evaluated with both well-log and seismic data in Tertiary unconsolidated sediments from the Gulf of Mexico. While the sensitivity of one attribute versus another to discriminate pore fluid is often debated, the sensitivity of the three attributes are not independent but can be traced back to the fluid factor. The three attributes along with their statistical distributions for different pore fluids were measured in 183 reservoirs and then used to calibrate the seismic amplitude in a 3D survey to "true" reflectivity values thus allowing quantitative pore-fluid classification. Surprisingly, the calibrated reflectivity attribute (fluid factor) showed a more robust pore-fluid interpretation than the inversion attributes of Poisson impedance and lambda-rho.



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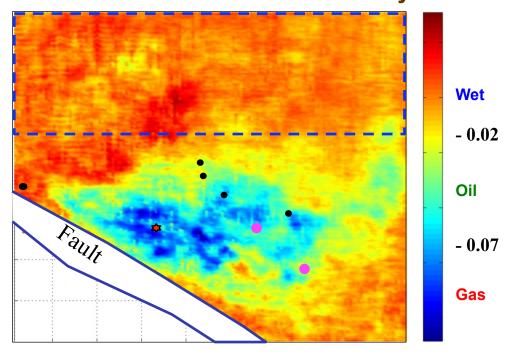
About our Speaker: Fred J. Hilterman received an engineering degree and PhD (geophysics) from Colorado School of Mines (CSM). He worked at Mobil and was a professor at UH where he co-founded the Allied Geophysics Laboratory. In 1981, Fred co-founded Geophysical Development Corporation (GDC) which was bought by Geokinetics. Fred is Geokinetics Chief Scientist for Processing and Reservoir Geosciences and is also a Distinguished Research Professor at UH.

Fred started on field crews before working in processing, seismic modeling and then petrophysical studies. At UH, Dr. Milton Dobrin introduced him to Continuing Education (CE) courses and since he has been a CE lecturer for GSH, SEG and AAPG. In 1983, Mike Graul and Fred introduced the Seismic Lithology Course, which was recently offered as a GSH Webinar.

As a longstanding member of GSH, his services include Vice-President, Spring Symposium Chairman, Webinar lecturer and frequent luncheon speaker. His services to SEG include DISC Instructor; Chairman of TLE Editorial Board, Vice-President and President. He has received numerous awards such as CSM Distinguished Alumni Medal, SEG Ewing Award, and Honorary Memberships in SEG and GSH.

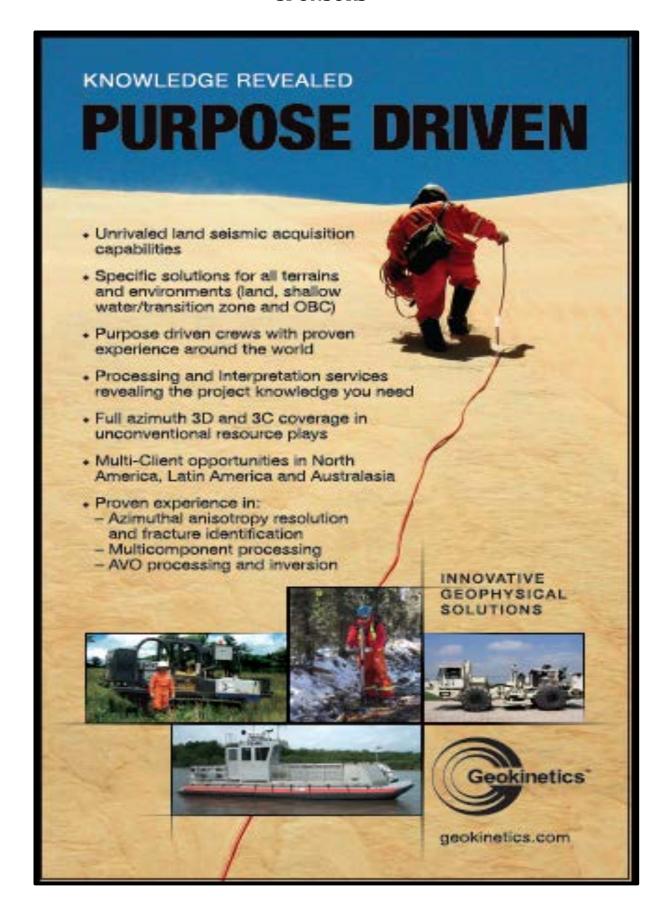
Fred is proud to be a member of GSH and of their accomplishments and would be honored to be part of the GSH executive team.

#### **Calibrated Fluid Factor Reflectivity**



Horizon Fluid Factor = NIP -.33 NIS - .002

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#### **Save-The-Date Announcement!**



## COASTAL BEND GEOPHYSICAL SOCIETY GOLF TOURNAMENT

October 23, 2015

1 p.m. Shotgun Format

NorthShore Country Club Portland, Texas

Fielding 100 players!

Sponsors welcome now! Please contact: Fermin Munoz

fmunoz04@hotmail.com

361-960-1126



## Corpus Christi Geological Society Scholarship Application Guidelines

#### Summer/Fall 2015 Semester

- 1. Applicant must be majoring in Earth Sciences and currently attending a college in the local area.
- 2. Fill out the application form clearly, completely, and sign it.
- 3. Short essay clearly explaining how this scholarship will assist you in achieving your geologic career goals and the reasons your application should be considered by the Committee.
- 4. Two (2) letters of recommendation one must be from a geoscience faculty member or from a supervisor with whom applicant has worked within a geoscience undertaking.
- 5. Applicant must provide a school transcript, please make sure it has your name on it. A web printout is acceptable.
- 6. Applications must be postmarked by: March 21, 2015
  Mail completed application to: Dawn Bissell, CCGS Scholarship Committee
  Chairman, 253 Circle Drive, Corpus Christi, TX 78411

Email **bissells@swbell.net** once you've mailed your application. If I do not receive an email, I won't be able to notify you if you've been selected. *Award notifications will be sent via email!!!* 

Please read requirements carefully and submit only complete applications. Applicants who have received a CCGS scholarship in the past <u>are</u> eligible to apply again.

Scholarships will be awarded based on merit and need. The award amounts may vary with the minimum individual award being \$500.

Award recipients will be recognized at the monthly luncheon April 15, 2015 and are encouraged to attend.

**Board Members:** 

Dawn Bissell - Chairman Brent Hopkins - Vice Chairman Leighton Devine - CCGS President Patrick Nye - Secretary/Treasurer Bob Critchlow - Member Beth Priday - Member JR Jones - Member

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#### Corpus Christi Geological Society Scholarship Application Form Summer/Fall 2015

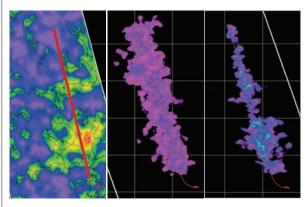
(Must be postmarked by March 21, 2015)

Last Name:	First Na	me:		
Mailing address:				
(where award may be mailed if applicant is unable to	o attend award	d presentation)		
City:	State:	Zip C	ode:	
Active Email:				
Award notifications will be sent via e	mail!!! E	mail <b>bisse</b> l	ls@swbell.n	<b>et</b> once
you've submitted your application.				
Daytime Phone:	Alternate	e Phone:		
University Currently Attending:				
Department:				
Scholarship is for class level (circle o	•			
Freshman Sophomore Junio	,	enior	Graduate St	udent
•		-		udent
Total Hours Completed:	Overan	JPA (MIIII	imum 2.5):	
Total Hours - Geology:	Geology	GPA(Min	imum 3.0)	
Hours Planned for Scholarship Seme	ster:	Geolo	gy Hours:	
Will this scholarship be used toward	field camp	?	Yes	No
Prior recipient of CCGS Scholarship	?		Yes	No
Applicant Signature			Date	

Mail application, along with essay, two letters of recommendation, and transcript to Dawn Bissell, CCGS Scholarship Committee Chairman 253 Circle Drive, Corpus Christi, TX 78411 **Must be postmarked by March 21, 2015.** Email <a href="mailto:bissells@swbell.net">bissells@swbell.net</a> once you've mailed your application. Award notifications will be made via email!!!

## the ACOUSTIC VIEW

### BEFORE. DURING. AFTER.



**Before:** Quiet Time recording before the frac images natural fractures and faults. **During:** Pumping time recording images the microseismically active volume during stimulation. **After:** Quiet time recording post-frac reveals the microseismically active production volume.

For more information:
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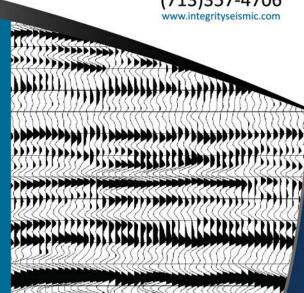
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### February 2015—Education Outreach Team

January brought a new year, and a new semester for area schools. Members of the Education Outreach Team made geologic presentations and judged science fairs at five schools.



Linda and Jerrold Simpson presented The Ice Age Fossils of Nueces County to Metro Elementary School. The fifth grade students sat in rapt attention and eagerly participated in the discussions.

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Geoffrey Hopkins presented to Gloria Hicks Elementary School on January 9<sup>th</sup>. Geoffrey is a regular presenter at Gloria Hicks and is always well received.

The Simpsons, Geoffrey, and Mike Lucente did two days of presentations at St. Pius X elementary school in late January. They covered all three of our topics: *The USGS Time and Terrain Map, The Ice Age Fossils of Nueces County* with the mural and bones, and *Rocks in Our Everyday Lives*. There were four groups – Kinder through 5<sup>th</sup> grade. A second grader was able to sound out and read the word 'extant'. Even the teachers learned something.

Bob Bell and Dawn Bissell judged the third, fourth, and fifth grade science projects at Galvan Elementary on January 13th.

Geoffrey presented the map and mural to Seashore Learning Center on the Island in early February.

Geology presentations are planned and more science fairs need judging in March.

Alan Costello always coordinates Earth Day – Bay Day, which is April 11, 2015 this year.

If you are interested in being a part of the Education Outreach Team, contact Dawn Bissell, bissells@swbell.net or 361-960-2151.

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## Enhancing reservoir definition for field modeling and simulation with seismic elastic properties and discontinuity analysis - A case history for Main Pass 61, Gulf of Mexico.

Randal Utech\*, Dan Shan, Dianna Shelander, Ellya Saudale and Kirk Rodgers, Schlumberger Ahmed Ammar, Tim Wilkinson, and Rick Clark, Energy XXI

#### **Summary**

The reservoir modeling and simulation of Energy XXI's GoM Main Pass 61, Pod B Oil Field integrated seismic elastic properties and discontinuity analysis to improve reservoir definition, lithology distribution and to identify compartments and fluid flow pathways. The results provided key basis for improving the estimation of recoverable oil, field management decisions involving water injection and work-over completions, and the identification of un-swept potential for new drilling opportunities.

The reservoir model integrated estimates of litho-fluid properties derived from prestack seismic inversion employing Bayesian classification methods. Reservoir boundaries and facies distributions were identified from shale and sand classification probabilities. Porosity distribution in the reservoir utilized acoustic impedance as a proxy. Seismic discontinuity analyses also provided a means to identify compartment boundaries, baffles and lithologic barriers to fluid flow.

Together, the integration of these seismic properties improved the accuracy of the geologic model and provided better understanding of reservoir production mechanisms.

#### Introduction

Conventional reservoir modeling and simulation field studies often underutilize information contained in the seismic data. Wells sample the earth with high vertical resolution at a single location, but seismic provides highly sampled information in the intra-well space. Utilization of the intra-well seismic information leads to better definition of the reservoir and simulation results.

While the seismic interpretation provides a framework for the reservoir model, seismic elastic measurements may be used to co-populate the reservoir model with estimates of lithology. Also, the enhanced resolution of inverted seismic (wavelet removal) improves the delineation of the reservoir boundaries, stratigraphic pinch-outs and the spatial distribution of reservoir facies.

The Main Pass 61 Pod B Field, discovered in 2001, has produced 17MMBO with a current rate of 3300 BOPD. The main productive formation is the Upper Miocene 'J6' sand

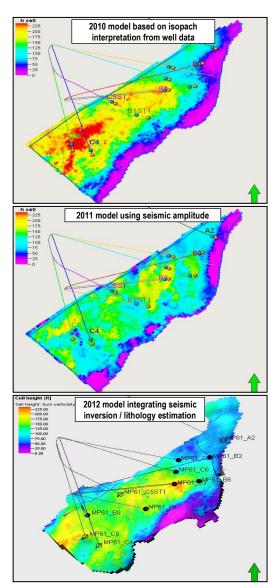
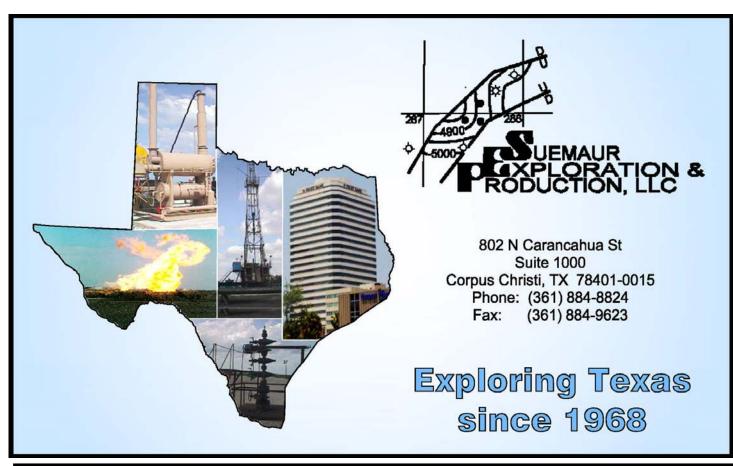
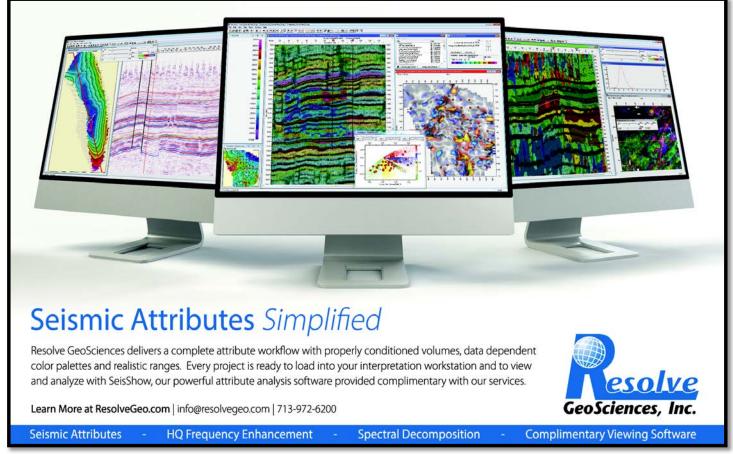


Figure 1: Comparison of net sand thickness from the 2010, 2011 and 2012 models. The upper model is obtained using contoured reservoir thicknesses from well data, the middle 2011 model utilizes seismic amplitude information (relative acoustic impedance) and the lower model integrates seismic inversion and the lithology prediction results.

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#### Seismic enhanced modeling and simulation

has six active wells (5 producers and 1 injector). The waterflood program began in 2003 to provide pressure support. The mismatched legacy simulations suggested a need for more rigorous methods integrating seismic data to reduce uncertainty of sand distribution and to understand reservoir dynamics.

Figure 1 illustrates three prior reservoir models showing comparisons of net reservoir pay thickness. The lower model integrates the 2012 seismic inversion and litho-fluid

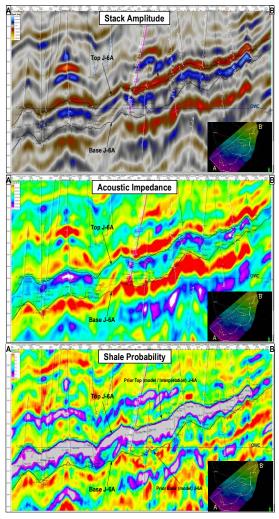


Figure 2: Well tie arbitrary line 'AB' showing the Seismic Stack, Acoustic Impedance and Shale probability arbitrary sections traversing the the reservoir. The interpretation surfaces (black) identify the top and base of the J-6A reservoir. Gamma log curves are posted on the wells (white). Note that the higher quality reservoir facies are in the upper zone of the reservoir and that shaliness increases toward the base of the reservoir.

prediction results. This model is consistent with both well and seismic measurements and more accurately characterizes the reservoir geology exemplified by improved production history matching. The two previous models include the initial 2010 geologic interpretation with isopach mapping from well data and the intermediate model utilized relative acoustic impedance as a proxy for reservoir thickness.

Figure 2 shows the reservoir interpretations on the conditioned stack data, acoustic impedance and shale probability sections along an arbitrary line extracted through the Pod B wells.

Reservoir simulation models often suggest the presence of reservoir drainage barriers such as a fault or compartment needed to achieve a production and pressure match. Seismic discontinuity analysis provides a reservoir framework for classifying subtle faults, reservoir compartments and fluid drainage barriers behave as conduits, baffles and barriers.

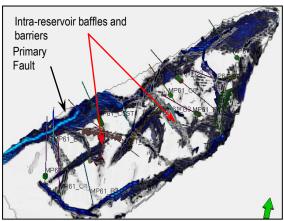


Figure 3: 3D volume rendering of candidate fluid flow baffles and barriers obtained from reservoir seismic discontinuity analysis.

Seismic discontinuity features over the Pod B field illustrated in Figure 3, require interpretation in conjunction with production and pressure history matching to determine degree of transmissibility of these features.

Identified traps and barriers provide valuable information pertaining to re-completions, field injection strategies and the development of new drill opportunities to capture and un-swept reservoir potential. A recently drilled well with pay down-dip near injectors confirmed the barriers identified by seismic discontinuity analysis and the potential for additional bypassed oil in the down-dip area.

#### continued on page 30



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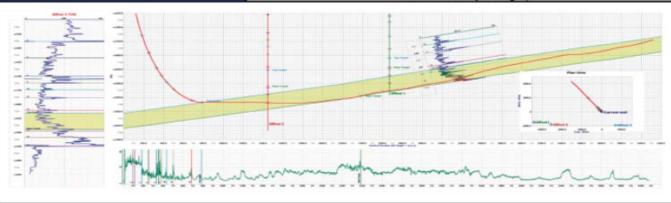
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#### Methods and Workflow

The input seismic data consisted of prestack depth migrated gathers with incident reflection angles up to 48 degrees. Prestack data conditioning included noise removal and velocity corrections. Processes applied in the time domain included:

- Spatially consistent velocity analysis
- Parabolic radon transform for multiple removal
- F-Kx-Ky filtering for foot print removal
- TauP processing for signal enhancement
- Angle stack decomposition
- Non-Rigid Matching for gather flattening
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Other processing included phase corrections in conjunction with well tie analysis. Depth conversion was completed post inversion, however, residual depth correction of the seismic is critical for accurate correlation of seismic to well data in depth. Petrophysical analysis included log data conditioning, editing, and environmental corrections. The Seismic discontinuity analysis consisted of two parameterizations of Ant Tracking, one for major faulting and a second parameterization to address subtle faults, compartments and reservoir barriers.

Bayesian methods were used to classify lithology from the probability distributions of seismic elastic properties taken from well log data (Figure 4). The rock physics analysis

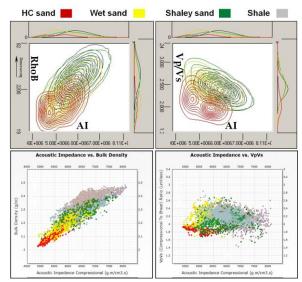


Figure 4: Probability distributions of elastic properties from log data for lithology classification (upper figure).

Rock physics analysis: Lithology class petrophysical cut-off's (shale volume and water saturation) plotted in elastic parameter space (lower figure).

utilized dipole sonic and density logs from reservoir wells to define lithology classes for sand, wet sand, shaley sand and shale expressed in terms elastic parameters.

This classification scheme was applied to seismic elastic property volumes obtained from the simultaneous prestack inversion (acoustic impedance, Vp/Vs and density) to derive seismic volumes for the most likely class and probability volumes for each rock class (such as the shale probability as shown in Figure 2). The mapping of reservoir parameters and facies distributions to the reservoir model was facilitated using volume rendered geobodies extracted from the seismic inversion and litho-fluid volumes.

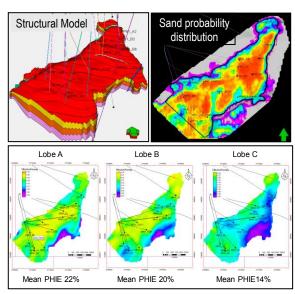
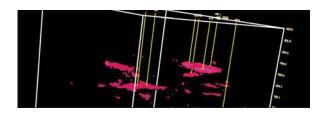


Figure 5: The structural model is shown in the upper left. Three reservoir zones defined to capture reservoir heterogenaiety. Facies were populated using extractions from seismic property volumes such as the sand probability volume (upper right) and acoustic impedance transformed to porosity. Zone porosity mapping for the three zones is shown in the lower figure.

Figure 5 illustrates the structural model used to capture reservoir parameter heterogeneities in three reservoir zones. The upper zone (lobe A) has the better porosity and permeability characteristics while the lower zones (lobes B and C) have increasing shale content with relatively poor areal connectivity. The well section in Figure 6 identifies the three reservoir zones, the gamma, resistivity and acoustic impedance in each wellbore. Also shown is the interpretation of zone connectivity and fluid flow pathways. Figure 7 illustrates the utility of the seismic discontinuity analysis. It is evident that the seismic 3D discontinuities provided very beneficial input for the current model. Combined with production/pressure information, the barrier transmissibility can be determined and incorporated into the model for simulation.

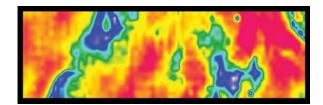
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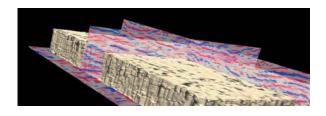
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#### Seismic enhanced modeling and simulation

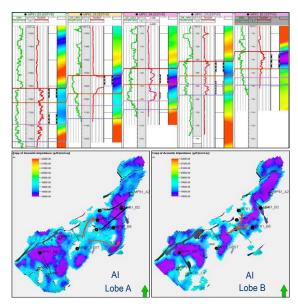


Figure 6: Well section identifies the three reservoir zones and the associated log signatures including acoustic impedance in each wellbore. The lower figure is an interpretation of the fluid flow pathways relative to the sand facies quality correlated with acoustic impedance. Combined with water cut information from different perforated intervals and production histories, the the fluid flow pathways and transmissivities can be identified.

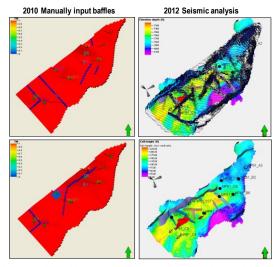


Figure 7: The red images on the left indicate barriers (in blue) that were manually introduced to the legacy simulation to match production histories. The upper right figure showns the volume rendered baffles and barriers obtained from the seismic discontinuity analysis (Ant Tracking). The lower right shows the barriers incorporated into the geologic model.

The production and pressure history matching (Figure 8) provides validation of seismic populated model.

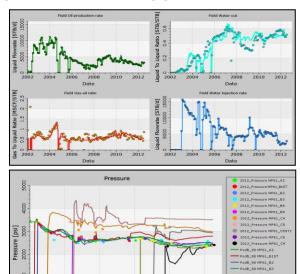


Figure 8: The field history match on oil rate, water cut, gas-oil ratio, water injection rate and pressure is shown above. The observed field production data are represented by dots. The lines represent the simulated production rates. The model achieved a reasonable match to field production rate and pressure.

#### Conclusions

The geophysical, geologic and engineering workflow carried out for the Main Pass 61 Pod B Field effectively integrated seismic information into the field modeling and simulation.

The integration of elastic properties and discontinuity attributes into the geologic and reservoir simulation model provided a clearer understanding of the reservoir dynamics. Importantly, this valued information has provided an improved basis for the estimation of recoverable oil, field management decisions involving water injection, workover completions, and the identification of un-swept oil for new drilling opportunities.

#### Acknowledgements

We would like to thank Energy XXI for their permission to submit this abstract for publication.

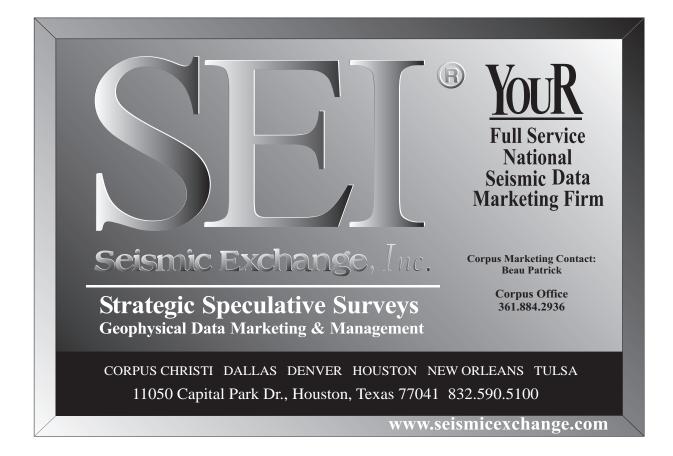
We also would like to acknowledge Lei Zhang, Claire Jacob, and Ken Nemmeth for their contributions.

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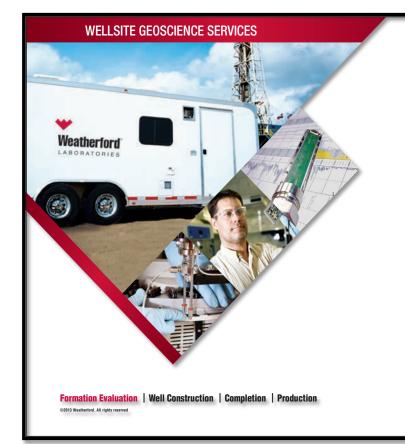


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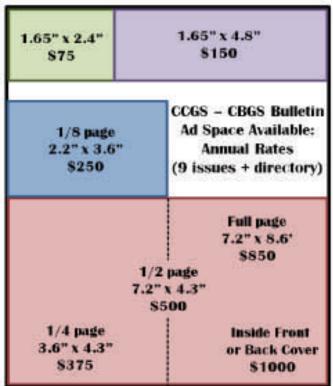


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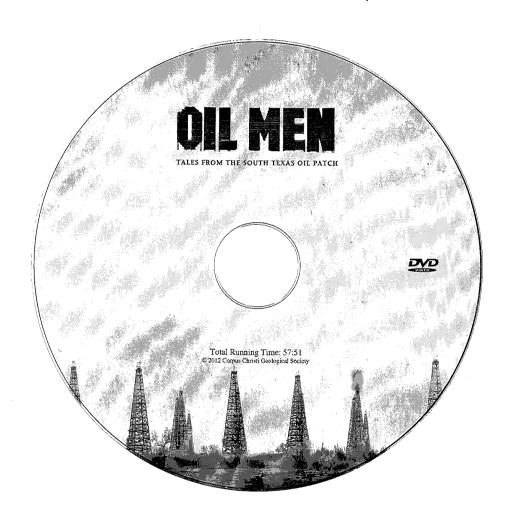
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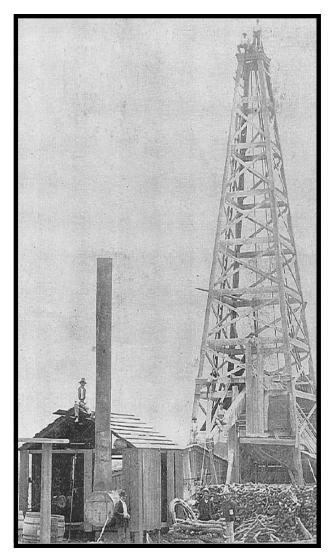
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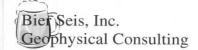
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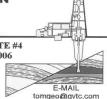
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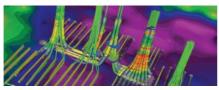




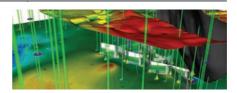
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