

# GEOPHYSICAL SOCIETY OF KANSAS

## PRESIDENT'S MESSAGE



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By the time you receive this newsletter, year 2005 will be in the record books. It was a year of record prices for the two key commodities which drive our industry. On August 30, NYMEX crude oil prices exceeded \$70.00/ bbl, while natural gas futures pushed \$15.50/mcf around December 14. OPEC appears to be satisfied that crude production rates for that group is appropriate for the current market, but they always reserve judgment until their next meeting, which is currently set for January 31, 2006. Winter pressure on natural gas volumes and prices remains to be seen.

The 75th Anniversary of the SEG has been celebrated in many different venues around the world during the year past, and having attended the Annual Meeting during November, I

can say the technical programs and all associated activities at that convention were well worth attending. The GSKS was honored to be a part of a charter "signing ceremony" attended by SEG President Craig Beasley (photo on p. 2).

This Society has exciting days ahead. On February 2, Dr. Gary Mavko will give his SEG Distinguished Lecture, an event we will jointly sponsor with the Kansas Geological Society (KGS). More about that event appears in Rick Saenger's piece below. I also anticipate that Editor Rick Miller will bring us new technical advances in the way of published articles, and continually forward-looking opportunities to sharpen our toolsets.

I have a few goals I'd like to share for 2006. Firstly, I

believe we can reach total membership above 100 before the end of the year. We have now received our first student application from Kuljeet Kaur of Kansas State University, and my hope is that we can move student membership to over 20 during this same period. We are a nonprofit organization, and with that comes responsibility to effectively disburse revenues from membership, advertising, etc. We can direct resources toward workshops for members, scholarships for deserving students and I'm sure many other avenues worthy of our attention.

As our society grows and matures, we need to be mindful of new ways and means of serving our broader geoscience community, so I hope we will be up

Continued on p. 2

### Joint Technical Sessions with the Kansas Geological Society

- In order to reach a larger audience, we will be regularly hosting joint technical sessions with our local geological society. See more details inside.
- Web Address: <http://gsk.sseg.org>

## Program Chairman's Column

On November 22, Margaret Stratton, of Anadarko Canada Corporation, presented *Impact of the Effects of Anisotropy in Canadian Foothills Exploration: A Case Study*. Ms. Stratton's talk gave us a look at seismic images of very complex structure in the overthrust Alberta foothills, and the associated positioning problems resulting from the highly contorted raypaths.

On December 1, we enjoyed a joint meeting with Kansas Geological Society, featuring R.S. Springman, of Oklahoma City, who presented *Finding Simpson Sand Production in Southern Oklahoma with 3-Dimensional Seismic Data*. Other KGS meetings of note include:

- January - 12 - Mike Cochran, KDHE, "Hutchison Sinkhole - A Mining Legacy"
- January - 17 - Ernie Morrison, "Update of Eubanks Field"

Continued on p. 3

## President's Message—cont'd

to the task of staying up with the technical curve. In fact, I believe we have the talent in this society to demonstrate leadership in new applications specific to our region. Many of our key reservoirs are carbonates, and this brings special challenges both from an exploratory as well as a development context. We are a long way from having all fundamental rock physics issues resolved, but progress is being made via converted wave technologies and other geophysically related tools.

We wish you all a very happy and prosperous New Year. May your elephants be tamed and your persistence be a hallmark



Left to Right—Dennis Hedke, Rick Saenger, Susan Nissen, Rick Miller, and Craig J. Beasley, SEG President.

attitude that prevails on a daily basis.

*Dennis Hedke*

## Technical Program Abstract “Rock Physics Strategies for Facies and Fluids Mapping”

*Dr. Gary Mavko, associate professor, geophysics, and co-director, Rock Physics and Borehole Geophysics Project. Stanford University.*



Over the last decades enormous strides have been made to understand the relations between the

physical properties of reservoir rocks and their geophysical signatures—the science now known as Rock Physics. We have gradually discovered more and more order in relations that once appeared disappointingly scattered, for example, velocity vs. porosity, porosity vs. permeability,  $V_p/V_s$  vs. saturation and lithology.

Rock Physics models now allow

us to quantify many of the elastic and inelastic signatures of rocks in terms of the rock composition, pore and grain texture, fluid saturations, and stress. However, even with these advances, we always have many more reservoir parameters than independent seismic measurements—even with shear wave-related attributes like AVO and Elastic Impedance.

A powerful strategy for minimizing the resulting interpretation uncertainty and risk is to develop means to quantify and incorporate geologic constraints into the Rock Physics models. We do this by modeling seismic amplitudes in terms of sedimentary parameters that control reservoir quality, and that also are consistent with the conventional geologic interpretation. Textural parameters that impact both

reservoir quality and elastic (seismic) signatures include mineralogy, grain size, sorting, cement, and shaliness. Hence, these are the key parameters linking the depositional processes and their seismic signatures.

In this presentation we will discuss how depositional and post-depositional processes in various geologic settings can be related to velocity, density, and  $V_p/V_s$  ratio. An array of robust models including elastic bounds, contact theory, and empirical relations, allow us to quantify and predict seismic signatures associated with plausible geologic trends. Some of the keys have been to explore effects of pore pressure, stress, temperature, clay content, compaction, fluid type, and saturation.

“We do this by modeling seismic amplitudes in terms of sedimentary parameters that control reservoir quality, and that also are consistent with the conventional geologic interpretation.”



**Carbonate Art !**





## Note from the Editor

As is true of most professional societies, exposure to technology and promoting application of our discipline is a core activity of GSK. Under outstanding leadership your society is beginning to “flesh out” its role and responsibility in the areas of information transfer and advancement of the technologies we use and rely on to practice our science.

It is my hope that we can bring to you information and discussions on a routine basis you find not only useful, but also thought provoking. We will bring you readable materials with enough technical meat to stimulate thought, but without the advanced developments and theory that promote midday slumber.

This is an exciting time in our discipline and we hope to bring you glimpses of what is and will be.

*Rick Miller*

## 2005-06 Council

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## Membership in GSK

Joining GSK can be accomplished either by requesting an application form from Membership chairman Mike Crouch at [segmike@mlcinc.kscoxmail.com](mailto:segmike@mlcinc.kscoxmail.com), or 316-264-4334, or by downloading an electronic form at <http://gskg.seg.org> and submitting the form according to instructions provided on the form.

<u>Membership Classifications</u>	<u>Annual Fees</u>
Active	\$25
Associate	\$25
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## GSK Committees

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## Program Chairman's Column—cont'd

If you are not receiving information regarding KGS programs, please request a copy of scheduled papers from Bob Cowdery at [sbc@southwind.net](mailto:sbc@southwind.net). Bob does a great job at recruiting speakers for the KGS technical program and we greatly appreciate his help in securing facilities for our technical meetings. Thank you, Bob for your coordination with our society.

We will not have a technical presentation in January but will be honored to host the Society of Exploration Geophysicist's 2006 Distinguished Lecture, presented by Dr. Gary Mavko, on Feb. 3, 2006. The Distinguished Lecture series, sponsored by the SEG, is always of excellent quality and we are very excited to be included on the schedule. An abstract and biography for Dr. Mavko's talk is given on p. 2.

On March 23rd, James Bogardus (PGS) will present “Update: Evolution of Land Seismic Acquisition, A 3-D Case Study from the Wichita Mountain Front, Oklahoma.”

Please continue to support our societies with your attendance at the technical sessions. We hope that you find the papers interesting and intellectually stimulating.

*Rick Saenger*

## The Crew Tracker As of December 20, 2005

Provided by Acquisition Company Representatives



System IV sensor planting guide.

Acquisition Company	Location (County)	Instruments
Lockhart Geophysical – Crew 1	Russell/Barton, KS	GDAPS IV
Lockhart Geophysical – Crew 2	Rooks, KS	GDAPS IV
Lockhart Geophysical – Crew 3	Yuma, CO	ARAM/ARIES
Lockhart Geophysical – Crew 4	Clark, KS	ARAM/ARIES
Lockhart Geophysical – Gravity	Gove, KS	LaCoste Romberg
Paragon Geophysical – Crew 106	Barton, KS	System IV
Paragon Geophysical – Crew 134	Russell, KS	System II
Paragon Geophysical – Crew 205	Logan, KS	System II
PGS Onshore – Crew 300	Stephens, OK	Sercel 408
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## Geophysical Teaching and Research at Kansas State University

Prior to the mid-1990s, students interested in pursuing a career in geophysics at KSU had limited course offerings from which to choose. Many courses in the geophysics option were primarily math and physics offered through those departments. There was only one geophysics course offered through KSU's Geology Department, which was taught by a professor from the Physics Department. After his retirement, the geophysics major, which had produced many successful geophysicists, was eliminated.

In 1999, K-State hired Drs. Stephen Gao and Kelly Liu, the first geophysicists brought to the Geology Department in the school's 136-year history.

At the present time we offer a total of six upper/graduate level courses in geophysics, including:

- ◆ Introduction to Geophysics
- ◆ Field Geophysics
- ◆ Exploration Geophysics
- ◆ Computational Geophysics
- ◆ 3D Seismic Data Interpretation
- ◆ Advanced Seismology

Last year we established a minor in Environmental Geophysics. We believe the future geophysics program at KSU will better serve the department and the university if a geophysics option is re-instated in the geological science BS program, and we are working toward that objective.

Our geophysical teaching and research facilities are comparable with, if not better than, many major research universities in the country (such as UCLA, where we received our PhD's). For instance, during the past six years we have purchased a comprehensive array of modern geophysical equipment, such as a gravimeter, magnetometer, seismic reflection/refraction system, ground penetrating radar recording system, broadband seismometer, digital seismic recorder, laser total station, and a GEM-3 electro-magnetic sensor.

We have excellent computing facilities including 12 Sun workstations, 2 Silicon Graphics workstations, and multiple PCs. We

have a total of 6,000 Gigabytes (6 TB) of disk space, 12 GB RAM (8 GB is on a Sun Fire V250 workstation with 2 processors), and several backup systems.

We have five sets of Geoworkstations hosting the Kingdom Suite seismic interpretation system, donated by Seismic Micro-Technology, Inc.

While geophysics is a vast and broad field within the geological sciences dealing with various aspects of the earth such as its atmosphere, oceans, structure, and processes, the focus of geophysics at KSU is to explore the interior structure of the earth.

Our research topics range from exploration of unexploded ordnance using magnetometers and ground penetrating radar, exploration for oil and gas using 3D seismic data, and to the study of the structure and dynamics of the deep crust and the mantle using elastic waves created by earthquakes or large explosions tens of thousands of miles away.

During the past six years we were awarded more than 10 external grants with a total budget of about \$1,000,000 to conduct geophysical research in many locations worldwide.

A total of 12 graduate students have entered the program with a focus on geophysics since 2000, and thus far six have graduated.

A few years ago we established one of two broadband seismic stations in the Kansas/Nebraska area. The station, officially named KSU1, has been considered as a 'backbone' station in the ANSS (Advanced National Seismic System). We are seeking federal/state/private funding to expand the station into a multi-purpose, small-aperture, broadband array.

Additional information about Geophysics at Kansas State can be found at <http://earth.geol.ksu.edu/geophysics/>.

**Stephen Gao and Kelly Liu**  
Associate Professors of Geophysics



# Professional Directory



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*Operations Manager*

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*For additional information regarding participation in this program, please contact:*

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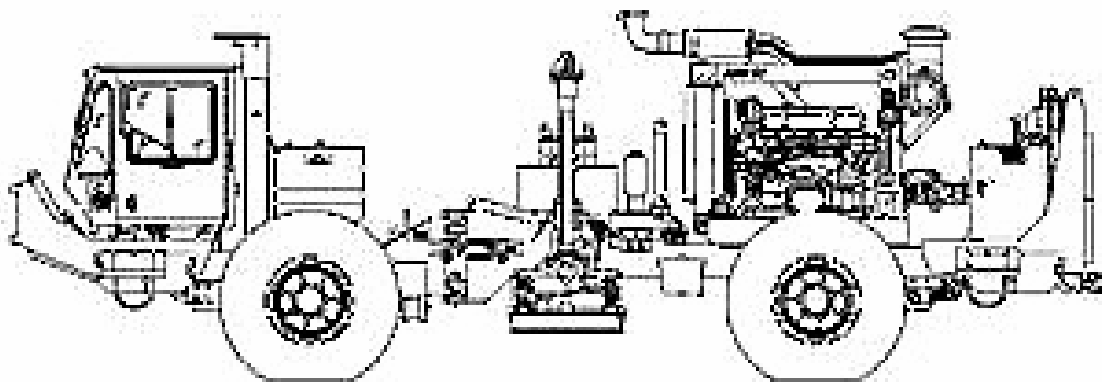
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## OUR MISSION:

To provide our members a quality venue for disseminating geophysically focused information pertinent to Kansas and surrounding regions.

We also seek to advance the geosciences by providing members opportunities to increase the understanding of geophysical principles and practice.

If you are aware of speakers / topics which would benefit members, let us know, and we'll pursue.

Additionally, we are actively seeking research papers and results to share with our audience. If you are interested in publishing your work, please contact Editor Rick Miller.

### New Members

The Geophysical Society of Kansas is pleased to welcome the following new members:

Name	Affiliation	Location
Dave Purcell	Tricon Geophysics	Denver, CO
Richard L. Lockhart	Lockhart Geophysical	Denver, CO
Marc Sterling	Sterling Seismic Services	Denver, CO
Bill Schorger	Sterling Seismic Services	Denver, CO
Kuljeet Kaur (student)	Kansas State University	Manhattan, KS

## GSK ADVERTISING

**GSK is seeking subscribers to fill space in future newsletters. Our publishing cycle is bi-monthly, January-February, March-April, etc.**

**Preferred formats for electronic files are typical Word document (.doc), .jpg, .pdf, etc. Please check with us if you have questions.**

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Description	Single Issue Rate	6 Issue Rate
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