# San Joaquin Geological Society and Society of Exploration Geophysicists

***Date:*** **Monday, October 3, 2011**

***Time:*** **11:30-12:10 Lunch Buffet**
**12:15-1:30 Speaker**

***Place:*** **Petroleum Club**
**5060 California Ave**
**12th Floor Ballroom**

**PSAAPG Members & Mesozoic's**
**$25 w/reservation**
**$30 without reservation**

**Non PSAAPG Members**
**$30 w/reservation**

**Full-time Students with ID:**
**Free, Courtesy of Chevron & Occidental**

## Satinder Chopra - *AAPG Distinguished Lecturer*

ARCIS Corporation
Calgary, AB

Biography: Satinder Chopra received M.Sc. and M.Phil. degrees in physics from Himachal Pradesh University, Shimla, India. He joined the Oil and Natural Gas Corporation Limited of India in 1984 to 1997. In 1998 he joined CTC Pulsonic at Calgary, which later became Scott Pickford and Core Laboratories Reservoir Technologies. Currently, he is working as Chief Geophysicist, at Arcis Corporation, Calgary. Satinder expertise are special processing of seismic data involving seismic attributes including coherence, curvature and texture attributes, seismic inversion, AVO, VSP processing and frequency enhancement of seismic data. His research interests focus on techniques that are aimed at characterization of reservoirs. He has published 7 books and more than 200 papers and abstracts.

### Seismic detection of faults and fractures

Characterization of natural faults and fractures in the subsurface is essential to the design of effective drilling programs and exploitation of tight reservoirs as well as the improved performance of conventional reservoirs. The presence of naturally occurring fracture networks can lead to unpredictable heterogeneity leading to sweet spots and bypassed pay within many reservoirs. If they can be mapped, fractures may provide high permeability pathways that can be exploited to extract reserves stored in a low permeability rock matrix. The need to detect and characterize fractures has motivated the development of new and rejuvenation of older geophysical technologies concerned with or related to fractures. Some of the commonly used methods are the azimuthal AVO method, the use of coherence and curvature seismic attributes, wide azimuth data, multicomponent data and passive seismic techniques. Seismic attributes such as coherence and curvature can be used for both qualitative and quantitative interpretation of fractures. Both these methods will be discussed in the talk.

In general, curvature is an excellent measure of paleo deformation. With an appropriate tectonic deformation model, structural geologists can predict where the fractures were formed. However, since their formation, such fractures may have been cemented, filled with overlying sediments or diagenetically altered. Furthermore, the present-day direction of minimum horizontal stress may have rotated from the direction at the time of deformation, such that previously open fractures are now closed, while previously closed fractures may now be open. For this reason, prediction of open fractures requires not only images of faults and flexures provided by coherence and curvature coupled with an appropriate model of deformation, but also measures of present day stress provided by breakouts seen in image logs and seismic anisotropy measures.

Finally, I will illustrate some of the latest curvature measures such as *Euler curvature* for observing fracture lineaments, and *structural curvature* versus *amplitude curvature.* Applications of additional recent newer volumetric attributes such as *reflector convergence* and *reflector rotation* about the normal to the reflector dip have shown promise and will be touched upon. While the former attribute is useful in the interpretation of angular unconformities, the latter attribute determines the rotation of the fault blocks across discontinuities such as wrench faults. Such attributes can facilitate and quantify the use of seismic for stratigraphic workflows and for large 3D seismic volumes.

**SJGS WEBSITE**

http://www.SanJoaquinGeologicalSociety.org/

**SJGS OFFICERS**



**** RSVP ****

**By: Friday, September 30, 2011**

AAuffant@chevron.com
or by phone 654-7005

or PayPal on the SJGS Website:
http://www.SanJoaquinGeologicalSociety.org/