Special Coordinator
Satinder Chopra
Arcis Seismic Solutions, TGS

INTRODUCTION TO **APRIL FOCUS:**
Characterization of Reservoirs

Characterization of the dolomite reservoirs with the help of photoelectric index volume

RITESH KUMAR SHARMA, SATINDER CHOPRA AND AMIT KUMAR RAY

Seismic characterization of Montney shale formation using Passey's approach

RITESH KUMAR SHARMA, SATINDER CHOPRA AND AMIT KUMAR RAY

Seismic discontinuity attributes and Sobel filtering

SATINDER CHOPRA, RAJIVE KUMAR AND KURT J. MARFURT

Traditionally, seismic reservoir characterization has aimed at the determination of reservoir thickness, pore fluid, porosity and water saturation, amongst other properties. This has been done by using the available tools for integrating the well log and seismic data as well as the derived attributes for transforming them into the desired properties. Such an exercise provides the required information between and away from the well control points. However, with the present day emphasis shifting more towards characterization for the development of unconventional resources, geoscientists are now facing stiffer challenges, encouraging them to devise newer methodologies or techniques that can be used for addressing those challenges.

In this issue, I include three papers that highlight some of the important reservoir characterization exercises, including the discrimination of dolomites from limestones, shale resource characterization and improving the definition of subsurface features through additional new seismic attributes for more accurate interpretation.

Sharma et al. in their paper entitled *'Characterization of dolomite reservoirs with the help of photoelectric index volume'* describe a workflow for a discrimination of a dolomite reservoir from limestone. They use the photoelectric index (Pe) well log curve as a sensitive indicator of mineralogy and begin the exercise by crossplotting the P-impedance against S-impedance, colour-coded with Pe curve values. On this crossplot they discriminate between the limestone and dolomite clusters by choosing an axis of rotation such that a single attribute, called lithology impedance can be chosen to identify the formation lithology. This was then transformed into a 3D Pe volume, which was found to correlate well with the net to gross dolomite within the reservoir interval.

In their paper entitled *'Seismic characterization of Montney shale formation using Passey's approach'*, Sharma et al. introduce the application of a methodology for computing ΔlogR from seismic data for the Upper Montney shale interval in Canada. As a first step, ΔlogR computed at the well locations is correlated with different attribute curves that can be derived from the seismic data such as λρ, μρ, Poisson's ratio, etc. On finding that the λρ attribute showed a high correlation with ΔlogR, the linear relationship between the two was used to transform the λρ volume derived using simultaneous inversion into a ΔlogR volume. In addition to velocity and resistivity, the key parameters used for the characterization of shale reservoirs are porosity, gamma ray and brittleness. The authors demonstrate the application of extended elastic impedance and simultaneous inversion for GR, porosity and brittleness volumes.

In *'Seismic discontinuity attributes and Sobel filtering'*, Chopra et al. demonstrate that rather than applying the Sobel filter to the original seismic data, its application to the energy ratio coherence volumes enhances discontinuity features such as faults and channels. In their simple cascaded workflow with examples from Kuwait and Canada, the authors show that such an application results in crisper and more focused images, providing improved attributes for subsequent automatic fault plane extraction.

I hope the readers will find the papers in this section an interesting read.

Satinder Chopra's biography can be viewed on page 33.