Case Study: The Use of Seismic Attributes to Detect Channels and Enhance Stratigraphic Trap Interpretation

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ABSTRACT

We present case study to identify channels, faults and hydrocarbon traps in seismic data collected in Lavaca County, South Texas. From the prior studies, we know thatthere are identified erosional sequences within the zone of interest which create stratigraphic traps. The challenge of interpreting this data is that the channels are shale filled and difficult to image on a typical seismic display. The edges are steep, nearly 90 degrees. The channels have eroded into and across one another throughout the survey. We need to be able to understand the complex geometry of the channel and fault systems in order to locate the hydrocarbons. Channels and hydrocarbon traps can be interpreted more effectively with the help of several well-known seismic attributes that have been used routinely by geoscientists to delineate and display channels, fans, canyons, etc. These attributes are based on the algorithms that are inferring geometrical properties from spatial variations in seismic amplitude data. In particular, seismic attributes like similarity, dip of maximum similarity, curvature, and instantaneous dip can offer great solutions for stratigraphic interpretation, but typically do not contain enough clarity for subtle stratigraphic variations, small channel edges, eroded channels, or small geobodies. In this case study we additionally used a new patented geometry-based fault attribute symmetry. This attribute greatly enhanced the channel detection and stratigraphic traps interpretation workflow and helped to identify and visualize stratigraphic features that were not previously detected. The attributes were compared with each other and the results showed that this symmetry attribute generally improves the signal-to-noise ratio and provides the improved visualization of discontinuities associated with edges of the channels and faults compared to other attributes. The data and selected illustrations were provided by Black Pearl Exploration.