# 3-D Seismic Characterization of Small Faults and Possible Fractures in a Carbonate Reservoir: Case Study From Sabiriyah Field, North Kuwait, Kuwait

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## ABSTRACT

Identifying and mapping the distribution of small faults and associated fracture system in a reservoir is an important factor in understanding their geological significance which plays an important role in fluid flow and accumulation. In general it is difficult to map minor faults and associated structural elements which are represented by trace to trace discontinuities hidden in 3D seismic data. These subtle faults and discontinuities appear as minor changes in seismic waveform. Often such features are not identifiable using conventional 3D interpretation, but they can be highlighted using different types of seismic attributes. Modern multi-trace seismic attributes such as coherence, reflector curvature and other types of attributes greatly facilitate interpretation process by avoiding the need to interpret discrete horizons and enhancing sub-seismic lateral variations in reflectivity. In this paper, we will show the value of different types of 3D-seismic attributes in mapping small faults and possible fractures in the target reservoir, the Early Cretaceous Mauddud Formation of Sabiriyah Field of North Kuwait. The objective of the study was to gain better understanding of and to map all possible minor faults and associated fractures to improve the structural frame work for effective field development planning. We targeted the problems in two steps. The first step was to improve the signal-to-noise ratio of the available 3D seismic data using appropriate processing steps to reduce the noise and improve the signal to make the depositional geometries and structural features more explicit. The second step was to highlight and isolate these specific geological features in 3D using different seismic attributes. By integrating these approaches with sub-surface data it was possible to speed up the interpretation. The results shows that reprocessing, multiple-attribute analysis and 3D visualization significantly improved the seismic data quality which helped in resolving structural uncertainties and fine tuning the reservoir structural frame-work.