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Discontinuity attributes, their visualization and seismic interpretation: Case studies from Indus Basin, Pakistan

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There are a number of discontinuity attributes that are considered useful for identifying faults and small fractures that cannot be fully delineated using seismic amplitude data. Out of the many available discontinuity attributes, curvature and coherence have been selected because of their proven abilities to delineate faults/fractures effectively and also their suitability to the subsurface structures present in case of volumes used. This paper highlights the practical importance of curvature and coherence attributes applied on two seismic data sets (3-D volumes) from Indus basin, Pakistan, both exhibiting extensional tectonics. Curvature attributes can be measured in different directions but most-positive and most-negative curvature are found to be of best use in highlighting extensional regime's geometry very effectively. Apart from highlighting faults across a 3-D cube, curvature attributes also give useful information about the highs and lows present in the data set that can be well correlated with the subsurface geology. Coherence checks for similarity between adjacent seismic traces and can be calculated using different techniques like cross-correlation, semblance and eigenstructure measures after analyzing dips and azimuths. Coherence and curvature (most negative & most positive) cubes have been extracted using conventional Pre-stack seismic volumes after a careful selection of parameters. Different examples have been included, compared and explained with reference to coherence and curvature results. The use of mentioned attributes effectively demarcated faults' orientations and their lateral and vertical extents. Many of the small faults that were not clearly visible on conventional seismic data were well highlighted using attributes' results viewed and analyzed along time-slices as well as horizon slices.

Biography

Akbar Ali Asif has received his MSc degree in Geophysics from Quaid-e-Azam University Islamabad in 2003. He has over 12 years of Oil and Gas Industry experience. Currently he is working as a Senior Geophysicist with KUFPEC Pakistan since 2013. Previously he has worked for OGDCL for 9 years and LMK Resources for 1 year. In his career he has remained focused on Seismic data interpretation of both onshore and offshore blocks. His main fields of interest are seismic interpretation, prospect generation seismic attribute analysis and 3D visualization.

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