Curvature Attribute Applications to Seismic Data

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Abstract
A seismic attribute is any measure of seismic data that helps us better visualize or quantify features of interpretation interest. Seismic attributes have proliferated in the last three decades at a rapid rate and have helped in making accurate predictions in hydrocarbon exploration and development. They are widely used for lithological and petrophysical prediction of reservoir properties.

More recently, curvature attributes have been shown as a means of predicting fractures from surface seismic data. Curvature is a property of a quadratic surface that quantifies the degree to which the surface deviates from being planar. Roberts (2001) introduced a number of different measures of curvature for surfaces that emphasize small-scale features that might be associated with primary depositional features or small-scale faults.

Three-dimensional estimates of volumetric curvature have also been attempted (Al-Dossary and Marfurt (2005)). Comparison of coherence and curvature displays, for different volumes have indicated an important observation; while coherence could be featureless over a zone of interest, curvature displays may not be. This observation seems valid as both coherence and curvature are measuring different attributes of the input seismic data volume. While curvature may show subtle flexures, coherence may not see them as it is sensitive to lateral discontinuities only. Examples will be shown to illustrate this.

References

Roberts, A. 2001, Curvature attributes and their application to 3D interpreted horizons, First Break, 19, 85-99.

Al-Dossary,S. and K.J.Marfurt, 2005, 3-D volumetric multispectral estimates of reflector curvature and rotation: Submitted to Geophysics.