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Some applications of volumetric fault image enhancement

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Summary

The interpretation of faults on 3D seismic data is often aided by the use of geometric attributes such as coherence and curvature. Unfortunately, these same attributes also delineate stratigraphic boundaries (geologic signal) and apparent discontinuities due to crosscutting seismic noise. Effective fault mapping thus requires enhancing piecewise continuous faults and suppressing stratabound edges and unconformities as well as seismic noise. To achieve this objective we apply two passes of edge-preserving structure-oriented filtering followed by a recently developed fault enhancement algorithm based on a directional Laplacian of a Gaussian operator. We demonstrate the effectiveness of this workflow on a 3D seismic volume from central British Columbia, Canada.

The volumetric fault image enhancement workflow described above provides a means of comparing the 'fault' dip magnitude , 'fault' dip azimuth and fault probability attributes for linear discontinuities. This approach helps in the manual interpretation of faults on workstations, and it provides a useful input for software designed for automatic extraction of fault planes. The methodology followed in this work enhances the desired orientation of linear geologic features, and their interpretations can be carried forward to the next step in terms of their correlations with production data.