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The Effect of Noise Attenuation on Data Driven Interpreter Guided Fault Analysis

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Prior to any structural attribute analysis on 3D seismic data it is usually necessary to undertake noise cancellation to remove the noise and enhance data quality. We present the results of applying noise cancellation techniques to 3D seismic data and show how that can improve our imaging and analysis of faults. Furthermore we look at automated methods for improving the mapping of major and minor faults using a unique fault workflow.

To be effective volumetric noise cancellation must attenuate noise whilst minimizing the loss of information in order to maintain what is genuine geology. To do this we systematically apply edge preserving methods for attenuating both random noise and high spatial frequency coherent noise that may be masking our true representation of faults. Seismic attributes such as Semblance can then be applied to identify discontinuities within the data which may correlate to structural faults. These types of discontinuity attributes are very sensitive to noise in the data, so running the algorithms on noise attenuated data can have a significant impact on the quality of the result and the scale of the faults that can be interpreted.

Structurally oriented and adaptive filters significantly enhance the reflector continuity and improve lateral and vertical imaging of faults by attenuating higher frequency noise whilst preserving edges.

We will present examples of the effect of noise cancellation on the complete fault workflow from initial attribute analysis to semi-automated fault extraction and analysis, and show the improvements in the fault interpretation with the application of noise attenuation.