Seismic discontinuity attributes and Sobel filtering

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Mapping geologic edges such as faults or channel levees forms a critical component in the interpretation on 3D seismic volumes. While the more prominent features can often be easily visualized, smaller features critical to understanding the structural and depositional environment can be easily overlooked. Careful manual interpretation of such features is both tedious and time consuming. Seismic discontinuity attributes that enhance edges not only accelerate the interpretation process, they also provide a quantitative measure of just how significant a given discontinuity is in relation to others. Since seismic attributes extract all subtle features in the seismic amplitude volume, preconditioning the data to enhance geologic edges and minimize edges due to acquisition and processing is critical to the analysis.

In the present work, we find the application of a Sobel filter to energy-ratio coherence volumes significantly sharpens faults and channel edges of interest. We demonstrate this simple cascaded workflow with examples from Canada, where one of the objectives is to provide improved attributes for subsequent automatic fault plane extraction.