Gas Field Characterization Through the Use of Multi-Resolution Seismic Attributes

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Abstract

The quest for aspects of a seismic image that can assist with hydrocarbon discovery has led to the use of various seismic "attributes". Multi-resolution techniques, such as wavelet transforms, provide a means of obtaining spectral-decomposition attributes, not only on single traces, but across multidimensional data sets. An example of this type of method is the Stockwell (S)-transform, which is similar to a short-time Fourier transform, but with the advantage of a scalable, wavelet-like Gaussian window that provides multi-resolution analysis. The S transform's ability to quantify local frequency content makes it useful both as a source of new seismic attributes and a reformulation of old ones.

This case study presents an application of several new seismic attributes (based on the S-transform) to a gas-field play in Western Canada. The exploration target is a shore face sandstone as defined on 3D seismic data at about 700ms. There is gas production in the region and the basic geology of the prospective area was somewhat understood. While some wells had already been drilled, standard seismic images and attributes gave comparably less conclusive information rendering any further site and drilling decisions tentative. Here, the new attributes (particularly, a variant of "seismic sweetness") provided additional, risk-mitigating information that are projecting drilling decisions with elevated confidence.