Converted-Wave Processing in the Presence of Large Shear-Wave Splitting

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The usual procedure for processing three-component converted-wave data is to start by resolving statics and velocities on the radial component since it usually contains most of the reflected P-S energy. An image of the transverse component, which is the component perpendicular to the radial component, usually contains little energy and is often ignored. It is common to do all of the interpretation of the P-S data with only the radial component data. Energy on the transverse component is treated as a mild nuisance.

Shear-wave splitting due to velocity anisotropy is a primary cause of P-S energy appearing on the transverse component. Even though shear-wave splitting is commonly observed, its effects are often assumed to be small enough that it can be essentially ignored in processing and interpretation.

We show a 3C/3D dataset from western Canada where the effects of shear-wave splitting are large enough that it was necessary to reassess the usual manner of processing the data. Shear-wave statics cannot be resolved from the radial component for this dataset because the time delay between the fast and slow split shear waves is greater than the dominant period of the data. It was necessary to perform a shear-wave splitting analysis of the data before resolving statics, which required an entirely different approach to processing the data. The large shear-wave splitting also had a significant impact on other aspects of the data processing, such as velocities, deconvolution, and layer-stripping, which will be discussed in the paper.

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