

Comparison of $R_{ss}(0)$ estimates derived from P-P and P-S AVO extraction of multicomponent surface seismic data

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ABSTRACT

A commonly and widely used method of extracting an estimate of the zero-offset shear wave reflectivity, $R_{ss}(0)$, from seismic data has been through the use of conventional P-P AVO. However, with the recent advances in multicomponent exploration seismology, there has been renewed interest in extracting $R_{ss}(0)$ via a converted wave or P-S AVO approach (Stewart, 1991; Stewart and Bland, 1997; Downton et al., 1997; Goodway, 2001; Ursenbach and Stewart, 2002). From an estimate of $R_{ss}(0)$, the shear-wave or elastic impedances of the geological intervals under investigation may be obtained using the same inversion techniques that are commonly used to obtain the compressional-wave or acoustic impedances. With knowledge of both the acoustic and elastic impedances, the interpreter may be better able to discriminate lithologies and/or the presence of hydrocarbons.

In this paper we will first compare the estimates of $R_{ss}(0)$ obtained from using P-P and P-S AVO methodologies. The P-P AVO algorithm used is based on Fatti et al. (1994) while the P-S AVO algorithm employs a recent formulation as proposed by Goodway (2001). We then invert these two independent estimates of $R_{ss}(0)$ to yield elastic impedances. These seismic impedances are then crossplotted against the well log impedances to better quantify how well the two AVO methodologies performed and compare. The data used for these AVO extractions was a 2D-3C VectorSeis[®] line recently acquired from EnCana's Tarapoa Block, Oriente Basin, Ecuador.

References

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