

Analysis of Time-lapse Multicomponent Seismic Data from a Potash Mining Area in Saskatchewan, Canada

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Abstract

Seismic anisotropy is a subsurface property that can have a severe impact on the quality of subsurface seismic imaging. In this study, a multicomponent, time-lapse seismic survey is interpreted to investigate seismic anisotropy in a potash mining area in Saskatchewan. The focus of this study is the Devonian Dawson Bay Formation, a fractured carbonate overlying the Prairie Evaporite Formation. The full azimuth stacked seismic volumes were divided into 4 azimuthally sectorized sub-volumes that are made up of a stack of source-receiver ray paths covering a 45 degree aperture. Through interpretation and travel-time analysis of these data, we have observed weak azimuthal velocity anisotropy within the Dawson Bay carbonates. Furthermore, interval velocity analysis shows an increase in V_p/V_s ratio indicating a decrease in shear wave velocity through the Dawson Bay Formation. These results support the hypothesis of a Dawson Bay Formation that is fractured.