

Wavefield separation for shear wave reflection enhancement in seismic records

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Abstract

S-waves in borehole seismic data can provide velocity, attenuation, anisotropy and reflectivity information that are crucial for delineating reservoir geometry and fluid flow structures. Despite the success and other potential benefits of including shear waves in the interpretation of seismic data to discriminate gas related amplitude anomalies from non-hydrocarbon related amplitude anomalies, little efforts have been applied to the development of shear wave technology. S-waves processing is yet to become a routine in borehole geophysics. This paper describes a procedure and some techniques for processing shear waves in a multi-component borehole seismic data– as a precursor for S-wave reflection imaging. The procedure is divided into three key stages, namely: suppression of P-wavefield in the multi-component data; attenuation of non-reflection arrivals in the S-wavefield; and separation of S-S reflection into up-going and down-going components. A set of high- resolution crosswell data acquired in a west Texas Oil field, U.S.A is used to test the method. The processed data confirmed the appropriateness of the method presented in this paper. The results yielded separated up-going and down-going S-S reflections that are traceable to the various reflectors depths. Shear wave reflection processing is a key stage in the development of shear wave technology for in oil and gas application.

Keyword: Crosswell seismic data, Shear waves; S-wavefield; S-S reflections processing; Wavefield decomposition.

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