



Simultaneously Acquiring 3D-3C Well Data During 3D Surface Seismic Survey: A Useful Quality Control Tool

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Abstract

3D seismic surveys are a tool for imaging subsurface structures. But then, adequate quality controls on factors such as attenuation, survey geometry, heterogeneity, travel path, and subsurface velocity which affect the shape of the seismic wavelet are not often emphasized during conventional processing of surface seismic data. Here, I conduct a feasibility study by simultaneously acquiring in situ seismic data with a fixed 3C borehole geophone during a 3D surface seismic survey. The source distribution coupled to the 3C borehole receiver is analogous to a walk-away VSP configuration. The goal is to assess how much information can be gained. For example, by considering travel time and amplitude information from the borehole seismic data combined with ray tracing methods, iterative application of different scaling parameters on existing sonic logs is used to assess the smoothening of the velocity model on travel time, NMO correction, stacking and geometrical spreading. Other issues to be addressed by the borehole seismic data acquisition geometry include: anisotropy and attenuation estimation as well as AVO.

From the above analyses a set of quality control tools which help characterize these factors are developed. According integration of the latter in the surface seismic processing strategy may help obtain an improved resolution of the subsurface structure investigated.