Integration of 3C Borehole and 3D Surface Seismic Data

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Abstract/Excerpt

In exploration seismology, imaging requires comprehensive information so as to obtain a qualitative evaluation of an area of interest. In the presence of an existing borehole in a given survey area, a way this can be achieved is by conducting an integrated study using 3D surface seismic data with a 3C borehole sensor fixed at depth to simultaneously record the surface shots. Valuable information like travel time, velocities, amplitude variations (with offset and azimuth), and attenuation can be extracted from the borehole sensor to help complement the processing and interpretation of the 3D reflection data. 3C-borehole data, acquired as part of a 3D seismic survey, from the Sudbury Structure was analyzed to evaluate its potential use. Polarization analysis showed its value as a quality control tool in checking the directions of the surface shots. First break travel time analysis also suggested azimuthal velocity variations in the surveyed zone. Such information is important for obtaining a 3D macrovelocity structure and as input for migration of the 3D data set. In addition, estimates of shot statics were obtained from the borehole data.