
Integration of borehole dips and seismic data

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High quality dip values for fault and bedding planes penetrated in boreholes can now be derived from wireline electrical imagery. It is therefore important to combine these data as far as possible with both surface and borehole-recorded seismic profiles. The methodology and results of such integration are described and illustrated with examples from two boreholes.

The first example derives from a vertical well. Fault and structural dip information from this borehole were projected as apparent dips onto several seismic line orientations that crossed the well. These dips were then corrected for horizontal versus vertical scale exaggeration; the latter scale varying with depth and being derived from well velocity data. These twice-corrected dips from various depths were then assigned to a 2-way time value using check-shot data. Seismic lines and the V.S.P. from the well were reinterpreted using these seismically-adjusted fault and structural dips with the aid of appropriate clear-film overlays. The occurrence of faults and fault orientations not observed on the original seismic interpretation allowed for the recognition of additional fault blocks and a revised structural picture for what was originally interpreted to be a single tilted fault block.

The second example comes from a deviated well. The fault and structural dip data were seismically-adjusted as in the first example, but were additionally positioned to take account of borehole deviation before being displayed as overlays. These dip data were integrated with surface seismic as well as a rig-source V.S.P. and a moving source (zero offset) V.S.P. An improved understanding of the structure and of sonic log calibration anomalies, was gained.

Seismically-adjusted borehole dip data used in an overlay format can provide an important tool to aid reinterpretation and better understanding of drilled areas. Dip overlays could also be made available for use with interpretation workstations to allow even greater manipulation and integration of borehole and seismic data.