WS15-B03

Wireline Deployment of Optical VSP in Vertical and Deviated Wells

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SUMMARY

This workshop contribution will show comparisons of heterodyne distributed vibration sensing (hDVS) based fiber-optic borehole seismic surveys with those achieved near-simultaneously with conventional electrical tools; in all cases, the results are obtained with a hybrid wireline cable incorporating optical fibres as well as electrical conductors.

Examples on vertical and offset wells are shown. We demonstrate that the improved vertical sampling resolution of the optical technique avoids spatial aliasing commonly encountered with the electrical results in spite of the superior signal to noise ratio of the latter. In recent field tests we achieved signal to noise ratios with the optical tool that are within a few dB of the comparable electrical results.

Nonetheless, achieving good coupling between the sensing cable and the formation is essential to obtaining high quality results; the electrical tools are designed with clamping devices at each level, a feature that a standard wireline cable does not allow. We show examples of successful coupling and poor coupling in both vertical and deviated wells. Reliably providing good acoustic coupling between cable and formation is a critical step to rolling out a successful service using hDVS in exploration wells.

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