

Borehole Geophysics: Recent Progress, Challengers, and the Road Ahead

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Abstract

Wireline-deployed borehole seismic technology has evolved from single geophones to small arrays (say 5-10 levels) to current state-of-the-art of 100 levels or more. Accompanying this downhole hardware development has been increasing focus on high-end applications, such as 3D imaging, anisotropy determination, and reservoir characterization products such as AVA analysis and seismic calibration. In addition work had progressed on the next level of technology – instrumenting the oilfield with permanent sensors, either installed in production wells with the completion or embedded in dedicated wells. With permanent instrumentation the door opens to use the much greater coverage that can be provided by multiple wells instrumented with large geophone arrays for 1/ larger scale, high-resolution 3D imaging and 2/ reservoir monitoring using either active surface or downhole sources or using passive data, for example due to re-activation of faults caused by depletion or re-injection of the reservoir.