Seismic Reflection Imaging with DAS Data for Long Term Reservoir Surveillance

Brian Fuller | Sterling Seismic & Reservoir Services

Bio

Brian holds BS (Western Washington University), MS (U of Wyoming), and PhD (U of Wyoming) degrees in Geophysics. He has over 30 years' experience in the oil and gas industry including successful oil exploration, software and technology development, and service company work. He has a long term professional interest in borehole seismology and is currently focused on development and application of reflection seismic imaging using horizontal DAS cables. Along with co-authors too numerous to mention here, Brian has been part of two SEG Best Paper awards, both of which were related to microseismic technology. He currently holds the position of Vice President of Reservoir Geoscience at Sterling Seismic & Reservoir Services in Littleton, Colorado and lives in the Denver area.

Abstract

Fiber optic cables deployed outside (and sometimes inside) well casing are used with surface seismic sources to record densely-sampled seismic data along the entire vertical and horizontal segments of wells. The common name for recording seismic data with a fiber optic strand is "DAS", an acronym for Distributed Acoustic Sensing.

In this presentation we describe some fundamentals of DAS technology and then show a new virtual seismic source processing method that leads to efficient seismic reflection imaging of reflectors below the entire length of the horizontal part of the DAS cable. We then discuss the rock mechanics link between production-induced changes in seismic velocity and production-induced changes in important reservoir properties such as pore pressure and stress direction. Time lapse DAS seismic imaging may provide a low-cost way to regularly update the pressure and stress status of a reservoir which can guide optimal re-frac strategies and help avoid fracing into pressure sinks created by nearby production.

At the time of this writing we can only show results from processing synthetic DAS data but we can say that the results from synthetic data are similar to the results we see in real data. We hope to have show rights for one or more real DAS datasets by the time this talk is presented.

**Brian Fuller, Jeff Omvig, Tom Bratton, and Marc Sterling*