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Degree and Year: MS Geophysics (3rd Year)

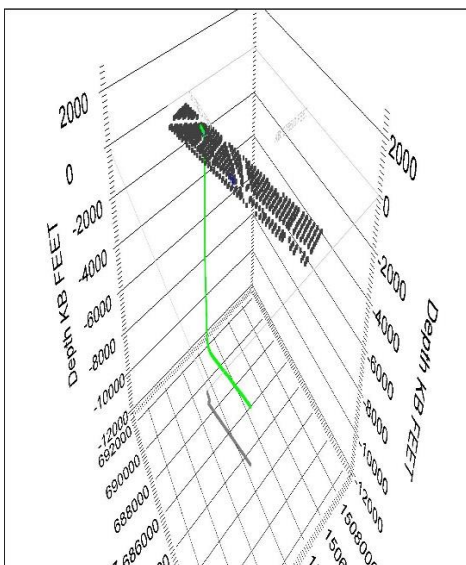
Research Interests: DAS, Fiber-Optic Sensing, Borehole Seismic

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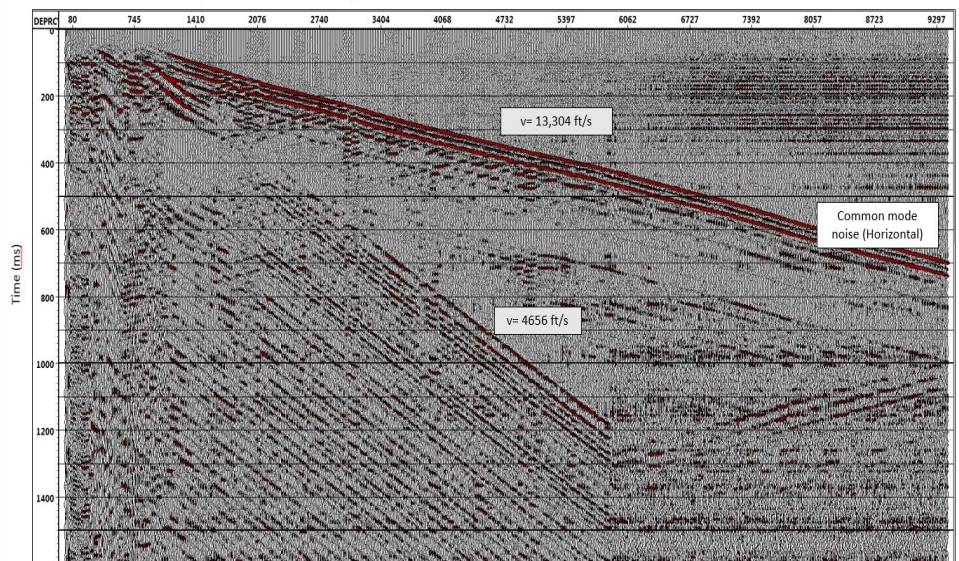


Abstract

Distributed Acoustic Sensing (DAS) is a fiber optic sensing technology in which the cable itself acts as a distributed sensor capable of detecting strain variations due to acoustic waves interacting with the fiber. Over the years, fiber optic technology has been deployed in many wells for pipeline surveillance, pressure, flow and temperature monitoring. There are many advantages for DAS over conventional geophone arrays, these include cost, spatial sampling, and repeatability of measurements for fibers permanently cemented in wells. Fiber response differs from geophones in that fiber can only record particle motion in its axial direction, therefore its lack of sensitivity from broadside waves still rises a challenge. For Vertical Seismic Profiling (VSP), DAS has been proven to be an effective tool for 3D/4D imaging. Past work used subsets of a 3D dataset to perform Zero-Offset VSP (figure) from which an initial velocity model was created using first break picks. Additionally, the zero-offset data was processed and compared to synthetic seismograms and available sonic logs. Current work involves elastic modeling for 3D VSP using DAS, noise suppression particular to DAS, processing of PP, PS reflections for imaging, and reservoir characterization.



Left Figure: Survey geometry, grey dots represent shot locations. Vertical section of well extends 9500 ft, horizontal section extends 5100 ft.



Right Figure: Vertically stacked VSP shot recorded near the borehole. Vertical section displayed, along with common mode noise (horizontal stripes) typical of DAS systems and tube waves typical of VSP. Downgoing wavefield velocity for a section of the well is displayed as well as tube-wave velocity.