Robert Hull | Pioneer

Understanding hydraulic fracture stimulations using a multi-tool method, microseismic, DAS, 4D-VSP, tiltmeters, and more

Biography:

Robert Hull is a Geotechnical Specialist for Pioneer Natural Resources and is currently assigned to the Geophysics Technology Group. Robert has over thirty years of industry experience, including fifteen years with a major oil company. He is a leader in 3D seismic and microseismic acquisition for Pioneer. Recently, he has been working with fiber based technologies, geomechanics, and microseismic to help characterize hydraulic stimulations in unconventional plays. Robert has experience in the Permian Basin, Eagle Ford, Barnett Shale, West Africa deep water, and offshore South Africa. He previously worked as a geophysical specialist for Maxus Energy - YPF- Repsol. Mr. Hull earned a bachelor's degree in geology from the University of Rochester and a master's degree from the University of Texas at Dallas. His masters research was focused on in seismic stratigraphy and sedimentology.

Abstract:

Implementing the appropriate horizontal and vertical well spacing, stimulation sequencing, and completion design are critical to maximizing unconventional well performance. One key attribute of the hydraulic stimulation is the geometry of the connected and propped rock volume, referred to as the stimulated rock volume (SRV). In this case study, several different methods are used to estimate the SRV over time.

A variety of methods are utilized in an instrumented vertical wellbore to invert for and estimate the heights and widths of the hydraulic fracture treatment. Data were acquired with externally mounted dual and single mode fiber optics for measuring strain, acoustics, and temperature. In addition, external pressure gauges, internal conventional tiltmeters, and geophones were also utilized. This instrumented well was used multiple times to record a number of nearby offset horizontal hydraulic stimulations and to record a time-lapse vertical seismic profile (4D VSP). By using multiple data acquisition techniques we obtained a more comprehensive and accurate estimation of the hydraulic fracture geometry and the dynamic processes taking place internal to the propagating fractures.

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