

FusionArray™: Maximizing the Value of a Wireline Fiber-Optics through integration of Microseismic and Cross-well strain data

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Abstract:

The use of Distributed Acoustic Sensing (DAS) data from fiber optics is increasingly being utilized in monitoring hydraulic fracturing of unconventional reservoirs, Enhanced Geothermal Systems (EGS), and geological CO₂ sequestration. While fiber-optics offer high spatial resolution and a larger receiver aperture at a lower cost than conventional geophone arrays, they have a limitation on sensitivity for waves with an incidence angle of 90° to the fiber. As a result, there is a 360° azimuthal uncertainty in microseismic event locations around the fiber. One solution to this is to use multiple fiber wells, but it is rare to have more than one dedicated to fiber monitoring. A better solution is to deploy a single fiber wireline with 3C geophones attached to the end of the wireline, which can improve the accuracy of event locations due to the addition of azimuth and increased receiver aperture. In this presentation, the results of a case study from a hydraulic fracturing project utilizing both fiber and geophones in the same well will be presented. The addition of azimuth information estimated from the geophones and co-located microseismic events recorded on both fiber and geophones resulted in improvement in the accuracy of the event locations. This improvement was observed as a reduction in the event location error. Moreover, the integration of cross-well strain data acquired from the same array with microseismic data provided a better understanding of the completions.

Speaker Bio:

Suresh Dande is currently working as Fiber Optics Subject-Matter Expert at ESG Solutions. He is responsible for leading and developing fiber optics data acquisition and processing technology. He previously worked as Geophysical Software Developer at ESG Solutions and as a geophysicist at Sigma Cubed Inc. He has 10+ years of experience in monitoring and processing borehole microseismic data. From 2009-2011, Suresh worked as a CSIR Research intern in Aeromagnetism at National Geophysical Research Institute, India. Suresh Dande received an M. Sc degree in Geophysics from Andhra University (India), an M.S degree in Geology from Southern Illinois University, and a Ph.D. degree in Geophysics from the University of Houston.

