



Zhao, X.P., D. Collins, and R.P. Young. (2010) Gaussian-beam polarization-based location method using S-wave for hydraulic fracturing induced seismicity. *CSEG Recorder*, 35, 28-33.

Gaussian-beam polarization-based location method using S-wave for hydraulic fracturing induced seismicity

Abstract

We propose a new method to locate hydraulic fracturing induced seismicity using three-component S-waveforms. The method requires only time intervals around the peak amplitude of the S-wave and does not depend on the arrival-time picking accuracy. The initial-value for the ray tracing is along the direction of wave propagation obtained from the eigenvector associated with the minimum eigenvalue by the Swave polarization analysis. Along the ray paths, the energy is back propagated by weighting a Gaussian-beam factor around the rays. Event locations correspond to the regions with the maximum summed energy in the resultant image. We have successfully applied the method to synthetic data sets with P-wave signal-to-noise ratio down to -2.4dB and to real data from a hydraulic fracture fluid treatment, and examined the sensitivity of the location accuracy to the percentage of S-wave splitting, the signal-to-noise ratio, the receiver network, and robustness to the number of available receivers.

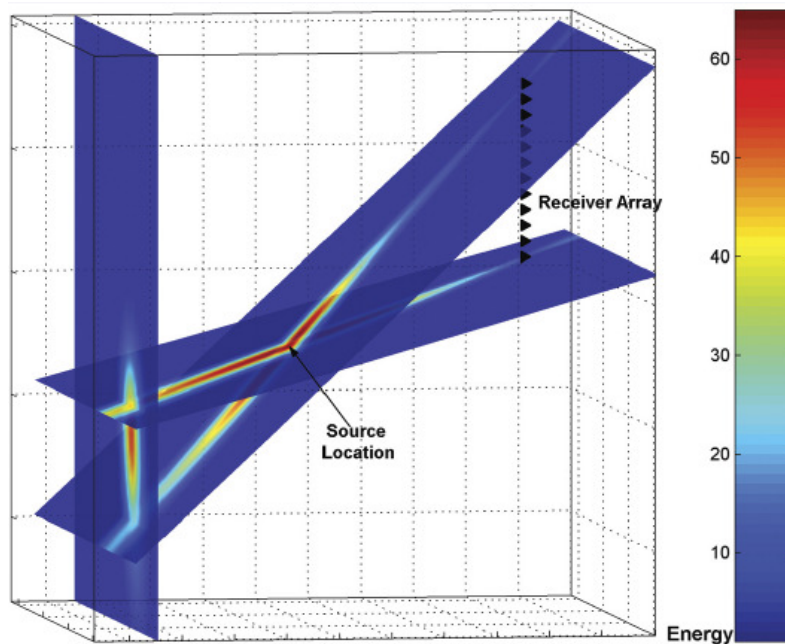


Figure: Representative energy distribution planes along the directions of propagation for upper and lower receivers of a linear receiver array (triangular markers) and the vertical plane shows the vertical energy distribution for the seismically active volume.

Website: <http://csegrecorder.com/articles/view/gaussian-beam-polarization-based-location-methods-using-s-waves>

Please contact us (info@microseismic.net) for the details of the paper.