

Investigation of the P/S Discriminant at Local Distances Using Simulated Waveforms

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The impact of wave propagation effects on the performance of the P/S ratio local discriminant is being evaluated during the third phase of the Source Physics Experiment, the Rock Valley Direct Comparison (RV/DC), conducted at the Nevada National Security Site. During the experiment a chemical explosion will be detonated near the hypocenter of a shallow earthquake. The direct waveform comparison on a dense network of seismic sensors will enable the investigation of seismic source signatures and discrimination between explosion and earthquakes sharing the same propagation path. We used high-frequency (0-10Hz) ground motion simulations to emulate the RV/DC experiment in order to investigate the generation and propagation of seismic waves at local distances, and the performance of the P/S source discriminant. The numerical experiments were performed using high-performance computing and a local velocity model with correlated depth-dependent stochastic velocity and density perturbations, that are needed for simulating wave scattering on a frequency range of monitoring interest. We found that at local distances the P/S discriminant is strongly affected by the degradation of the radiation pattern of source generated P and S waves due to wave path effects in the shallow crust, and that network averaging improves the overall discriminant performance.

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Promotional text

The SPE RV/DC project addresses the goal of development and testing seismic source discrimination techniques. The experiment will provide ground truth data needed for calibrating existing source discrimination techniques and improvements of physics-based waveform modeling tools.

Oral preference format

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