

Our Understanding of Explosion Seismic Waves from the Nevada Source Physics Experiments

The Source Physics Experiments (SPE) are a series of well-instrumented chemical non-nuclear explosions at the Nevada National Security Site (NNSS) designed to improve the understanding of seismic wave generation and propagation from explosions. The 5-ton SPE-5 on April 26, 2016, and 2.2 ton SPE-6 on October 12th, 2016, were the last of the Phase I series of six underground chemical non-nuclear explosions conducted in the same granite borehole. By varying the size and depth of the shots, while recording them on a common sensor network, ranging from near- to far-field, we are able to improve our understanding of the effects of yield, scale depth, scattering and emplacement properties on explosion seismic wave generation. This has resulted in refinements to previous models for explosion P-wave spectra, S-wave generation, P/S discrimination, correlation behavior and more. As part of the SPE, a temporary deployment of 1000 geophones was installed from April 20 to May 20, 2016, to record the SPE-5 explosion and background signals and noise before and afterwards. A set of large weight drops at 53 locations both inside and outside the array were also recorded, as were several local, regional and teleseismic events.

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