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Title: W17_geonuc “Application of the Spectral Element Method to improvement of Ground-based Nuclear Explosion Monitoring”

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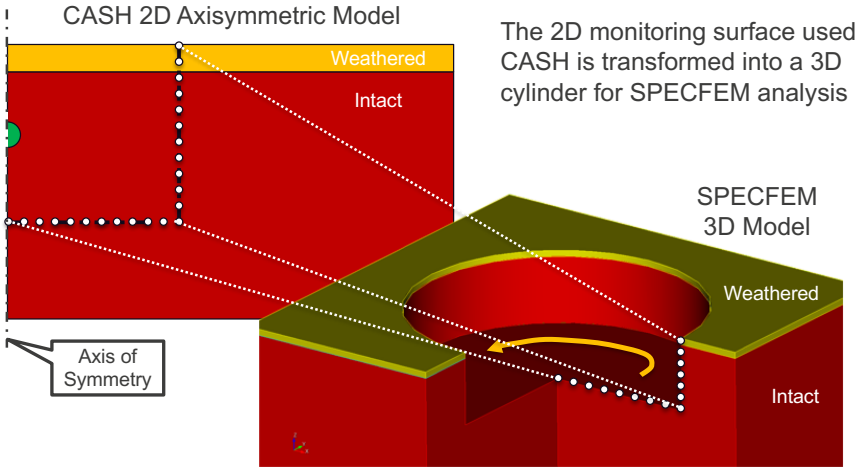
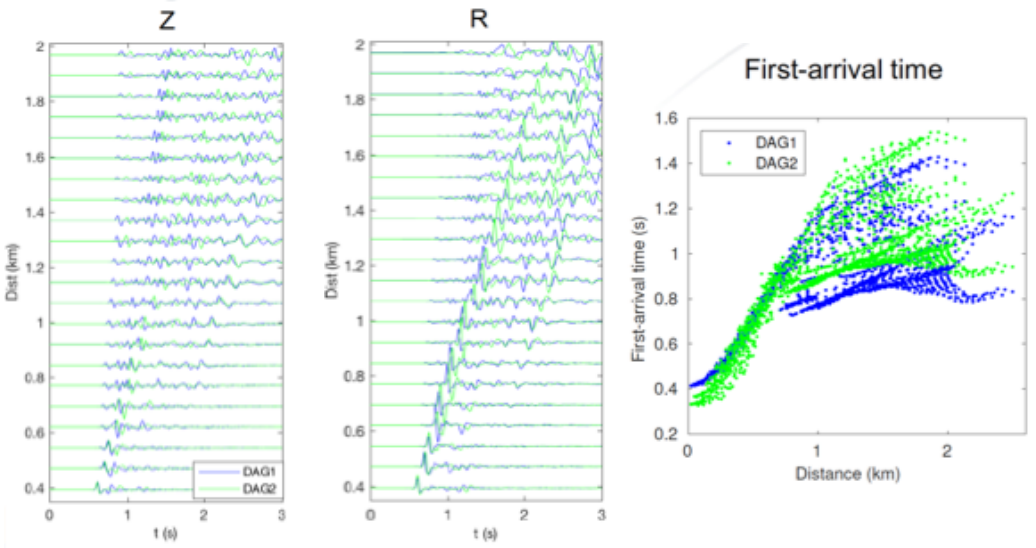
This project is in support of the Source Physics Experiment SPE (Snelson et al. 2013), which aims to develop new seismic source models of explosions. One priority of this program is first principle numerical modeling to validate and extend current empirical models.

We couple two types of codes:

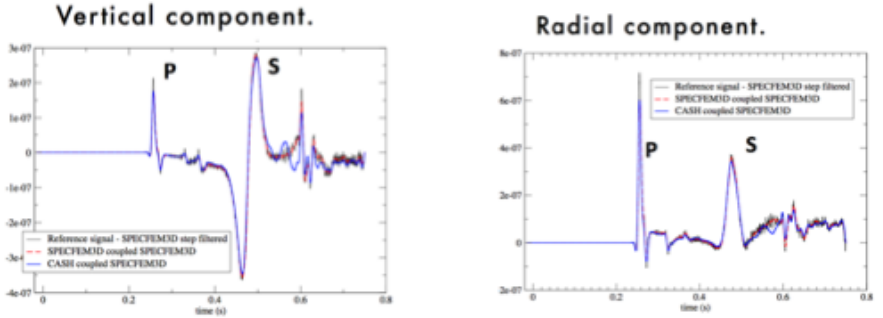
(1) Hydrodynamic codes near the explosion

(2) Full seismic code for remote propagation





Validation of the coupling: seismic waveforms modeled at an epicentral distance of 1200m for an explosion with a cavity radius of 10m.



Result of purely seismic modeling (SPECFEM3D) in a 3D model of the second site of SPE, called DAG. Left: vertical and radial component along a SW-NE profile. Right: arrival time.

DAG-1 and DAG-2 source differ by yield (1-ton, 50-ton resp.) and depth (375m and 300m).