

LA-UR-18-21210

Approved for public release; distribution is unlimited.

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

Author(s): Larmat, Carene
Rougier, Esteban
Lei, Zhou

Intended for: 2018 Institutional computing report

Issued: 2018-02-15

Disclaimer:

Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by the Los Alamos National Security, LLC for the National Nuclear Security Administration of the U.S. Department of Energy under contract DE-AC52-06NA25396. By approving this article, the publisher recognizes that the U.S. Government retains nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or to allow others to do so, for U.S. Government purposes. Los Alamos National Laboratory requests that the publisher identify this article as work performed under the auspices of the U.S. Department of Energy. Los Alamos National Laboratory strongly supports academic freedom and a researcher's right to publish; as an institution, however, the Laboratory does not endorse the viewpoint of a publication or guarantee its technical correctness.

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

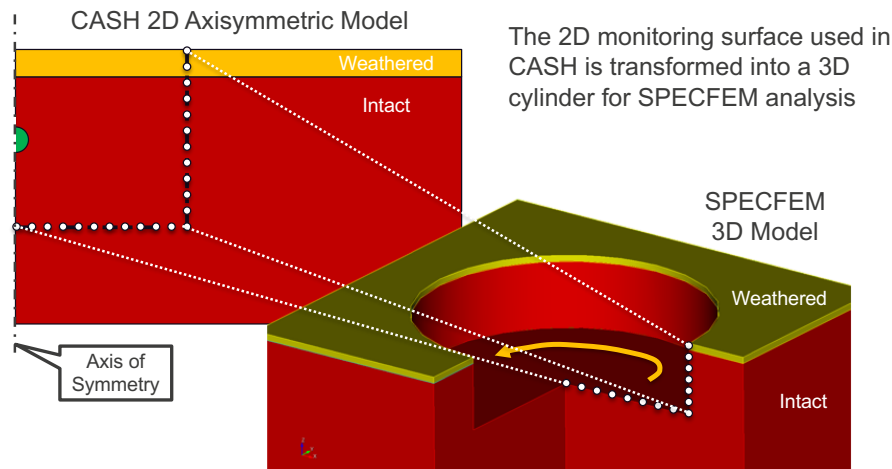
PI: C. Larmat EES-17

Participant: Esteban Rougier, Zhou Lei. EES-17

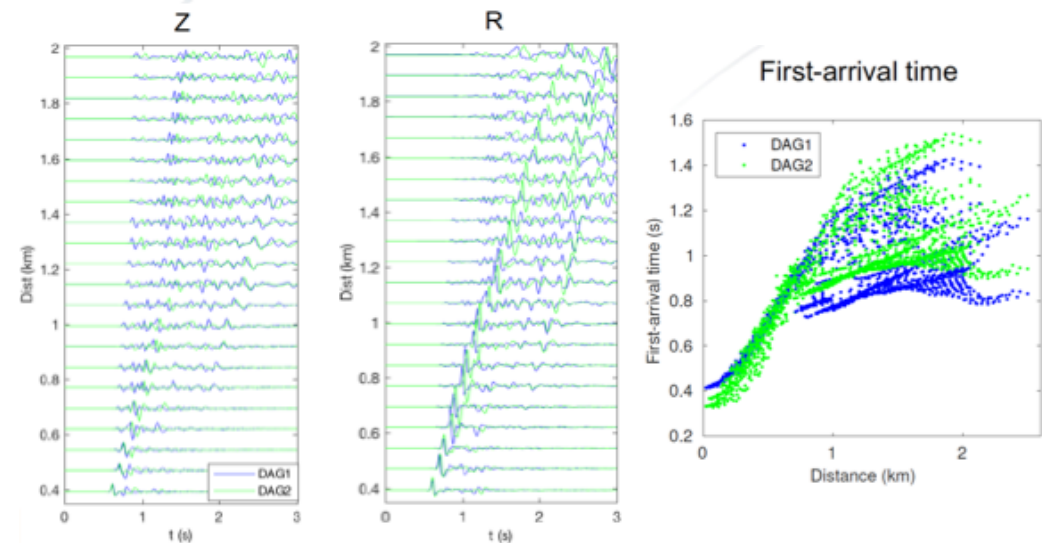
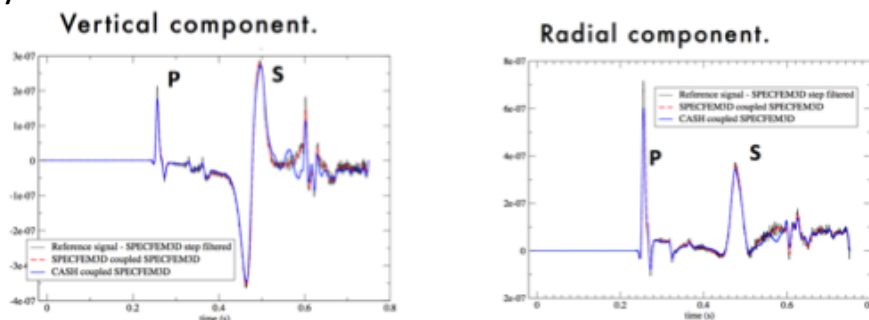
This project is in support of the Source Physics Experiment SPE (Snelson et al. 2013), which aims to develop new seismic source models of explosions. One priority of this program is first principle numerical modeling to validate and extend current empirical models.

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).