

LA-UR-13-22844

Approved for public release; distribution is unlimited.

Title: W12c_spewave "Source Physics Experiment modeling"

Author(s): Larmat, Carene
Rougier, Esteban
Bradley, Christopher R.
Patton, Howard J.
Knight, Earl E.

Intended for: Report

Issued: 2013-04-22



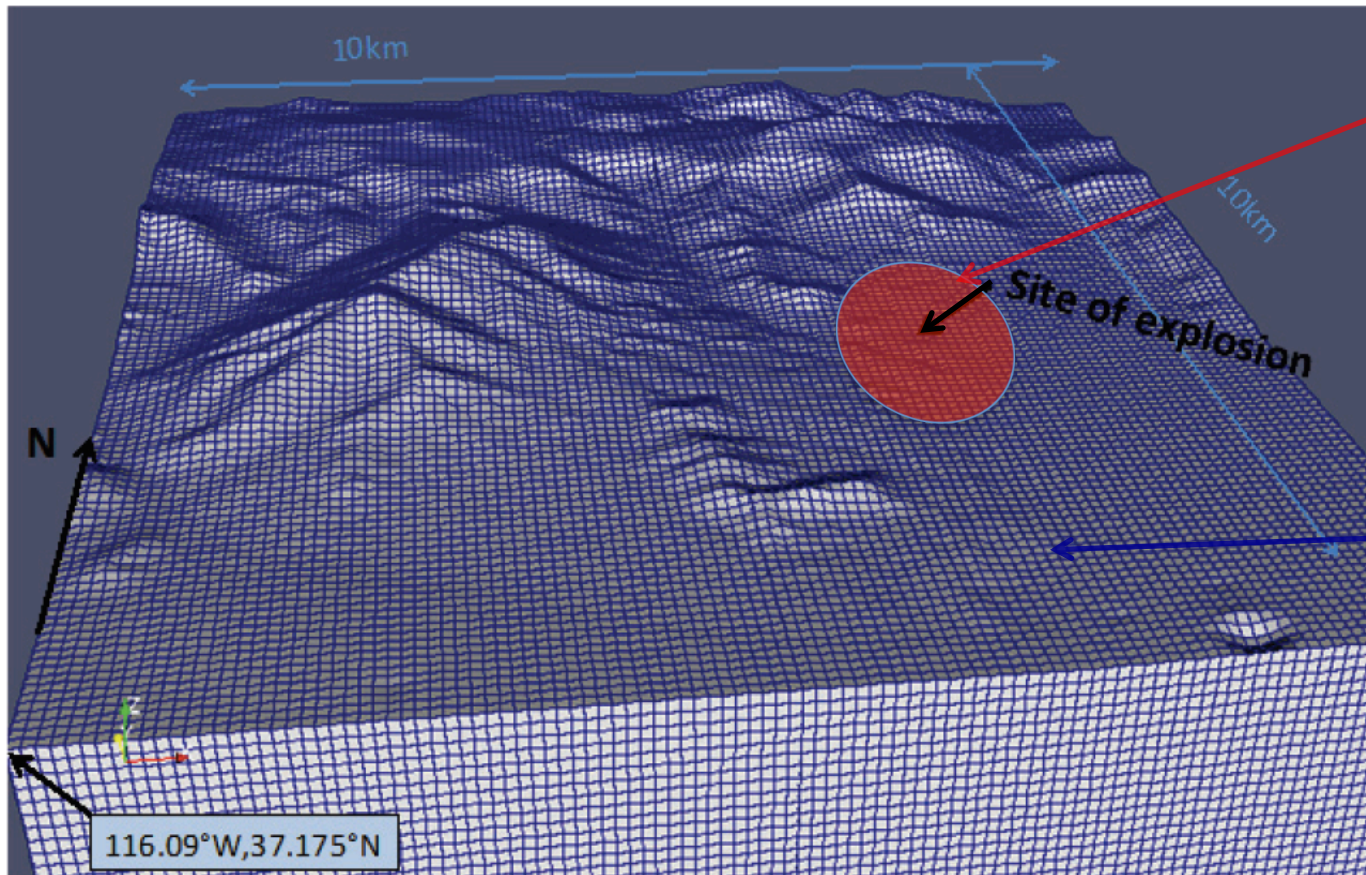
Disclaimer:

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.

W12c_spewave “Source Physics Experiment modeling”

E. Rougier, C. Larmat, C.R. Bradley, H.J. Patton, E.E. Knight, EES-17

How explosions produce Shear-waves? Answering this paradoxical question will represent a scientific achievement but also improve our capability of detection and identification of nuclear events.



Near-source high-strain area modeled using the hydrodynamic code “CASH”

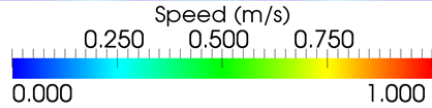
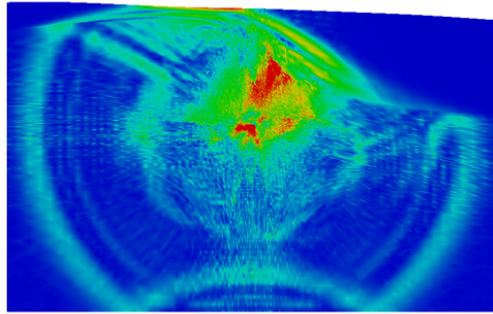
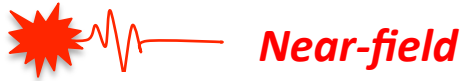
We developed a coupling interface between the 2 codes

Far-field area modeled using the classical elasto-dynamic equation solved by SPEC3D

Local topography and complex 3D structure are thought to be a big source of shear wave observed for explosive events. We will use the modeling set up presented here to quantify the effect of near-field processes (explosion) and far-field effects (propagation paths).

W12c_spewave "Source Physics Experiment modeling"

E. Rougier, C. Larmat, C.R. Bradley, H.J. Patton, E.E. Knight, EES-17

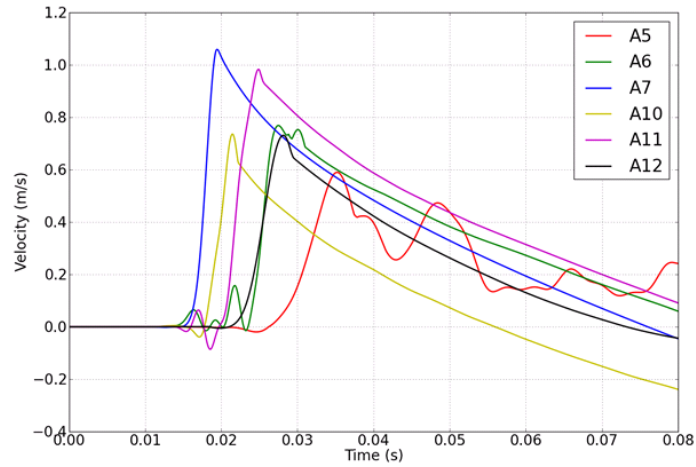


Cross-section of a modeling of an explosion using the Hydrodynamic code CASH. Heterogeneities in the structure affect the kinematic field generated.

coupled

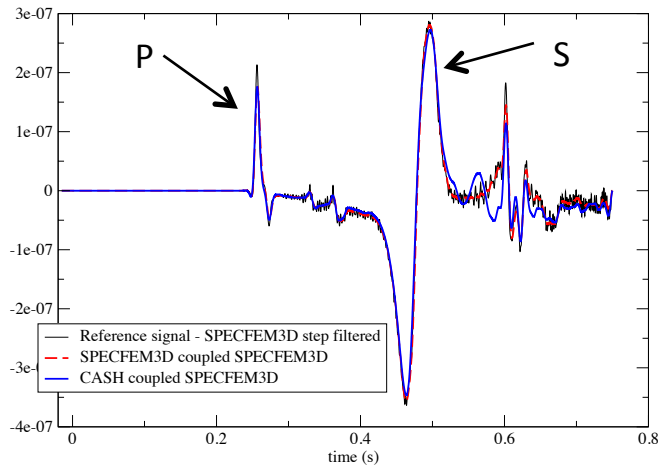
Far-field

Different rising times predicted by CASH for different observation surface gauges. These data are compared to real records of the experiment.



Waveforms predicted in the far-field for a pure explosion (no near-field effect). The CASH-SPECFEM3D prediction is shown in blue and compared to pure elastic modeling by SPECFEM3D.

Trace at 1200 m; vertical component.



Trace at 1200 m; radial component.

