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Title: W12c_spewave “Source Physics Experiment modeling”

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W12c_spewave "Source Physics Experiment modeling"

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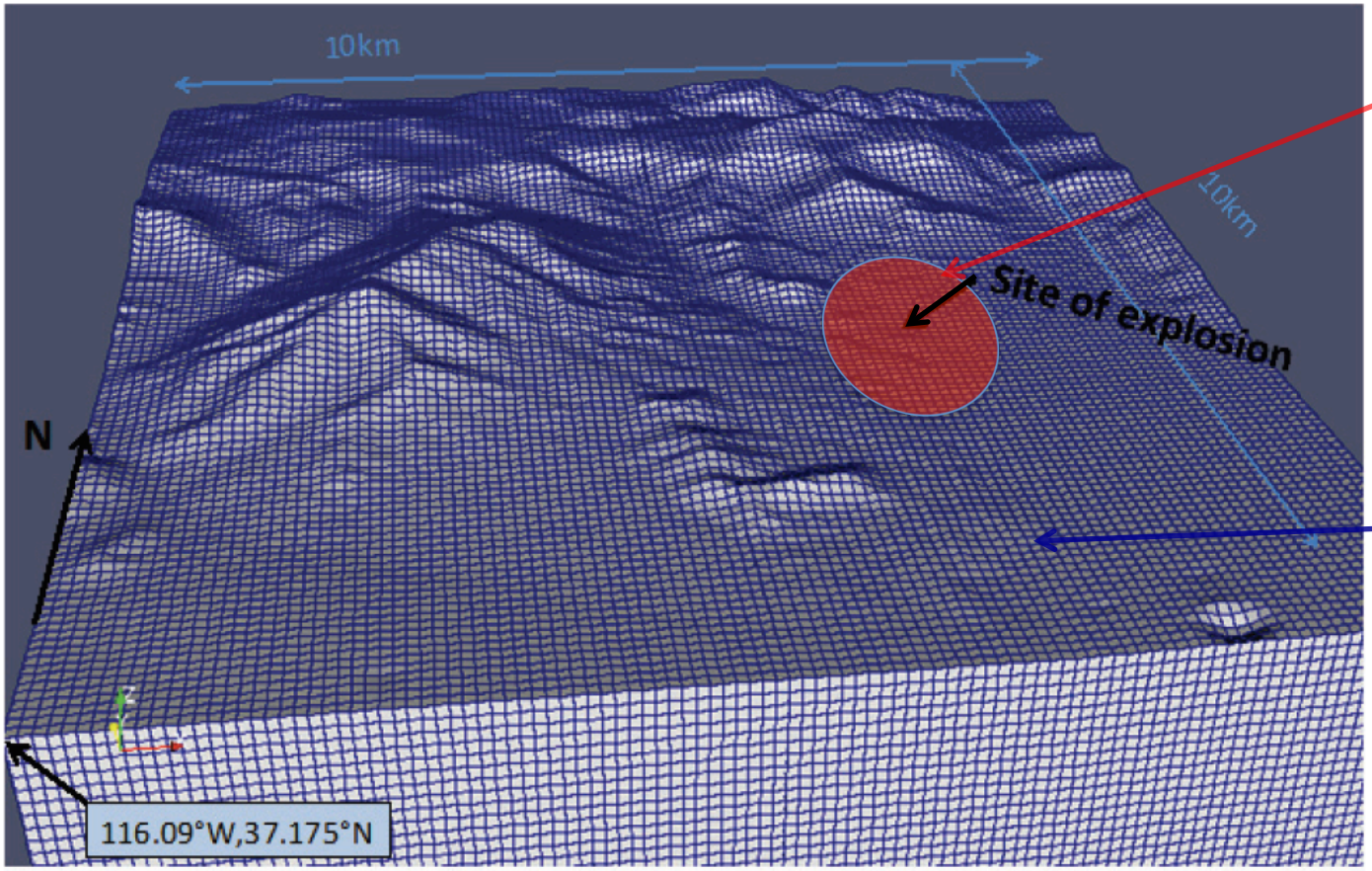
How explosions produce Shear-waves? Answering this paradoxical question will represent a scientific achievement but also improve our capability of detection and identification of nuclear events.



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 elastico-dynamic equation solved by SPECFEM3D

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).

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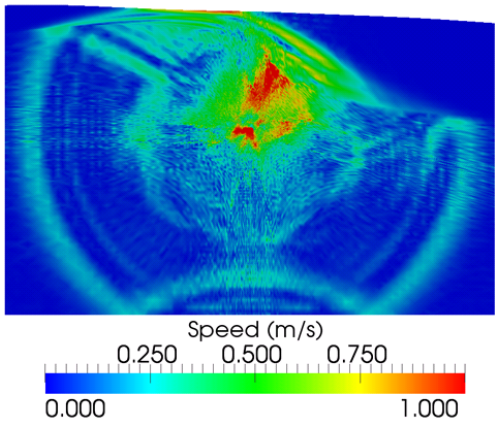
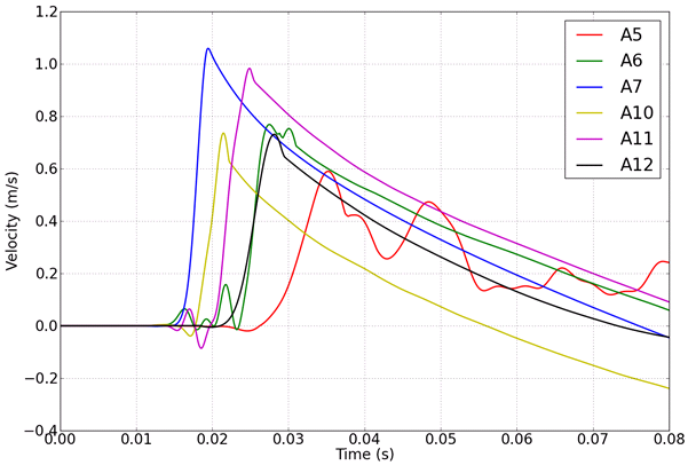
Near-field



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

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

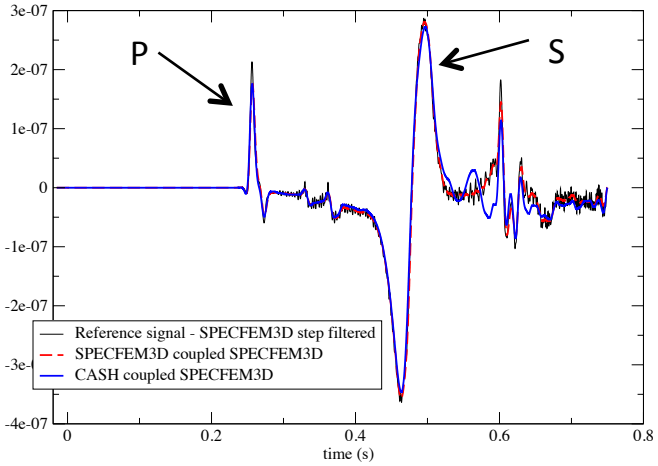


coupled

Far-field

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.