

Comparison of 3D and 1D Wave Propagation Effects in the San Francisco Bay Area on Simulated Long Period Ground Motion From the 1989 Loma Prieta Earthquake

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Broad Band Platform and Ground Motion
Simulation
Workshop September 8, 2013

LLNL-PRES-XXXXXX

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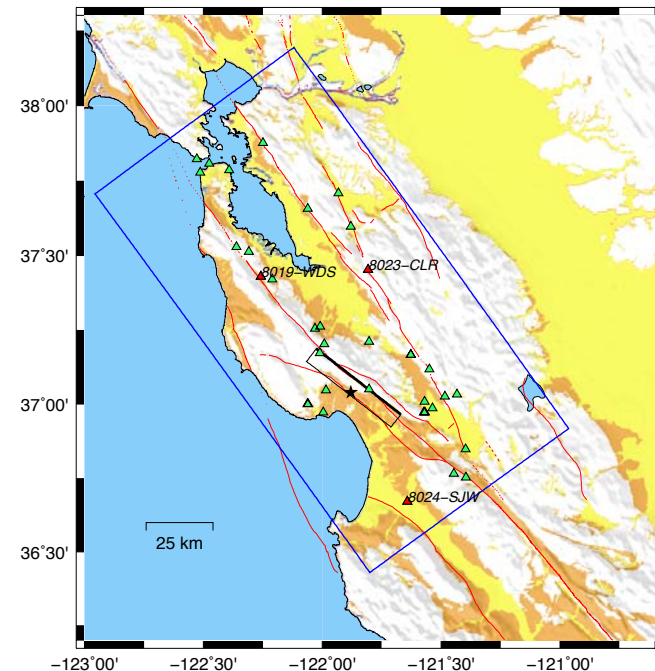
Objective: Compare the efficiency of 3D and 1D velocity models at capturing wave propagation effects in areas with complex underground structure and surface topography.

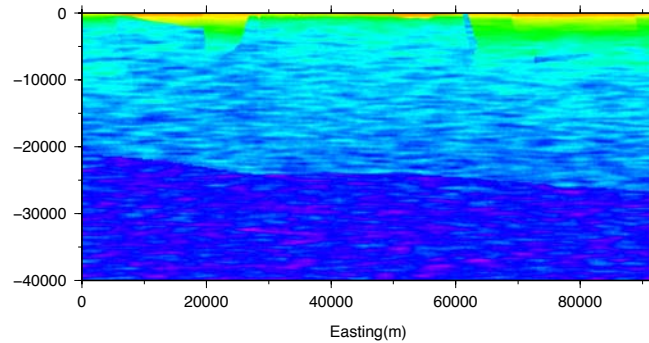
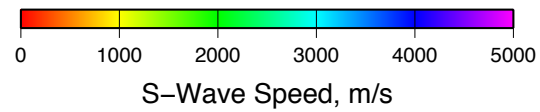
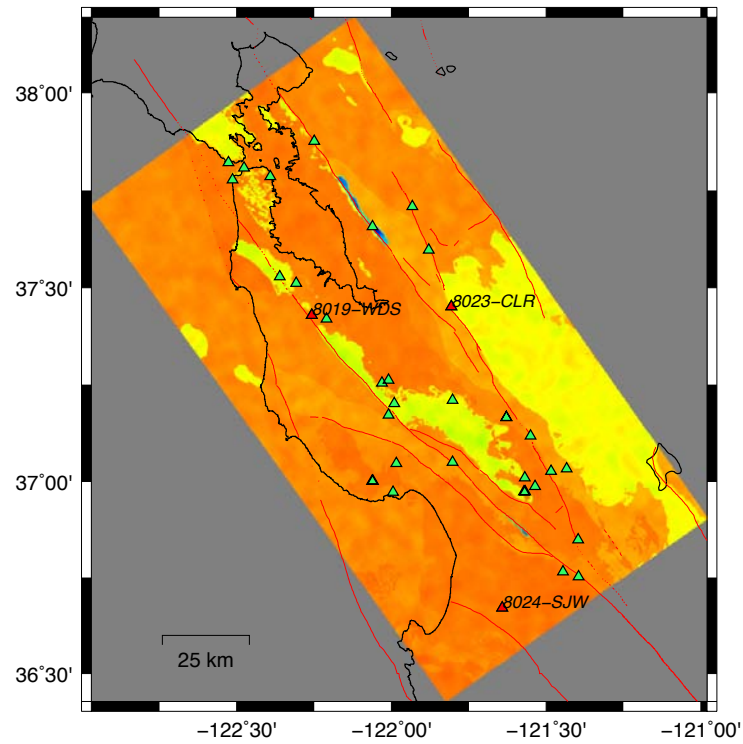
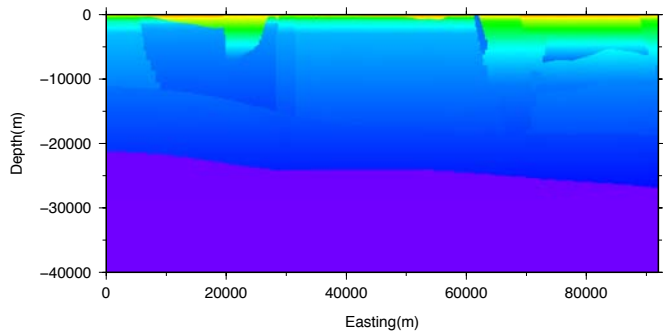
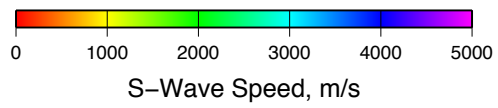
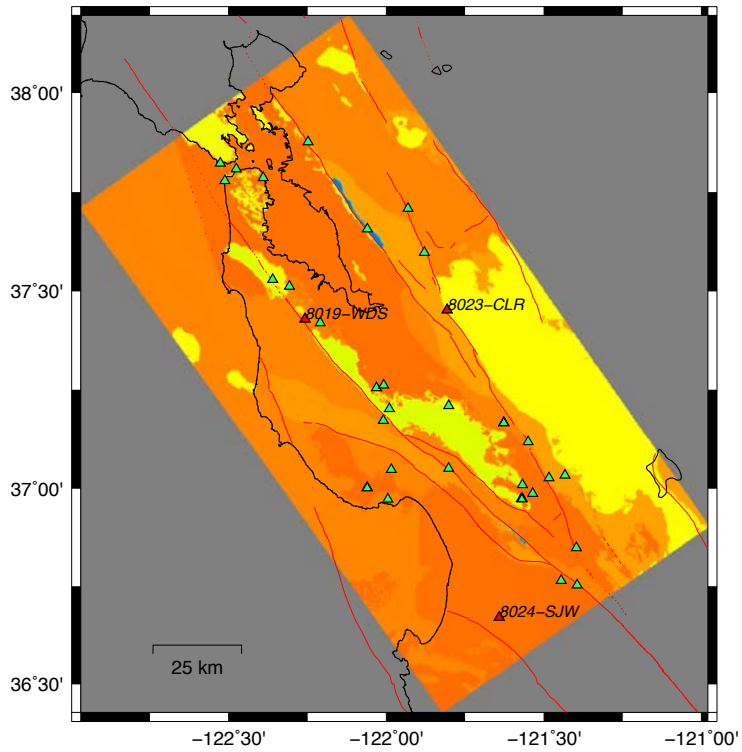
Approach:

- Simulate ground motion from Loma Prieta earthquake in the Bay Area
- Use kinematic rupture scenarios generated on the SCEC BB Platform in the long period range 1-10 s
- Analyze 3D wave propagation effects due to :
 - large-scale structural complexities
 - small-scale velocity variations
 - surface topography

3DFDM : 40m grid spacing, 3000 cores, $f_{max} = 1.3\text{hz}$

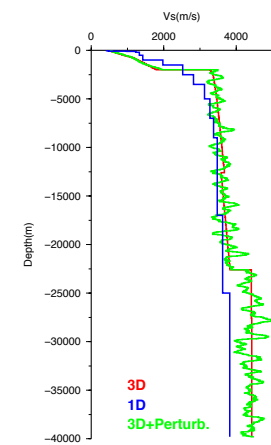
San Francisco Bay Area



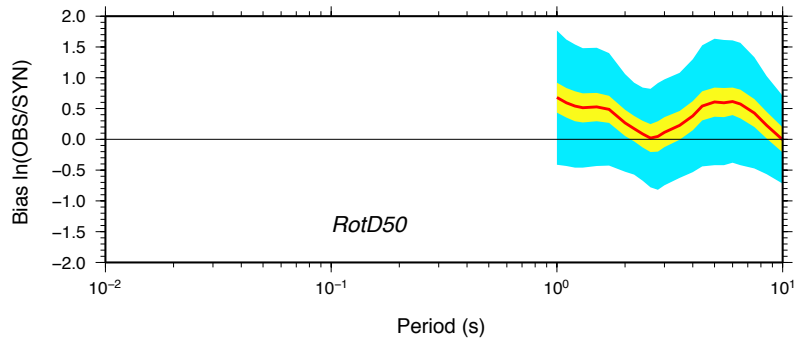


Stochastic Velocity Perturbations

$L_h = 2000\text{m}$
 $L_z = 200\text{m}$
 30%

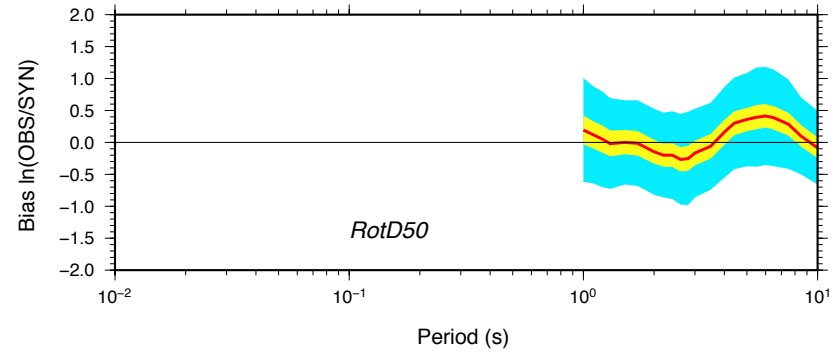


1D Velocity Model



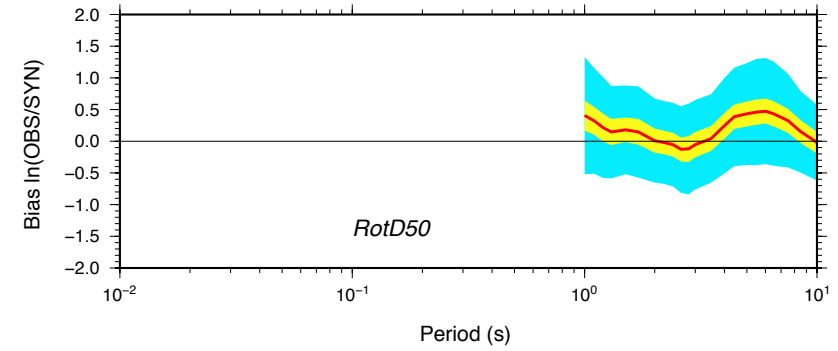
1D

3D Velocity Model



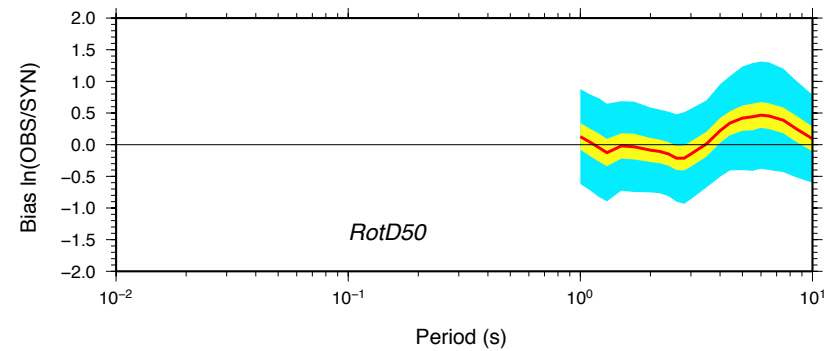
3D

3D Velocity Model Stochastic

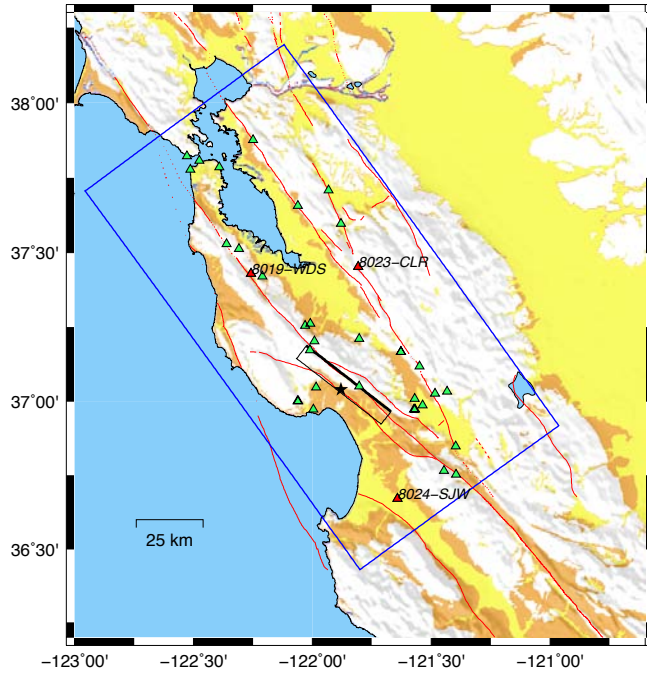


3D +
Stoch

3D Velocity Model With Topo



3D +
Topo



1D

3D

3D+Topo+Stoch

