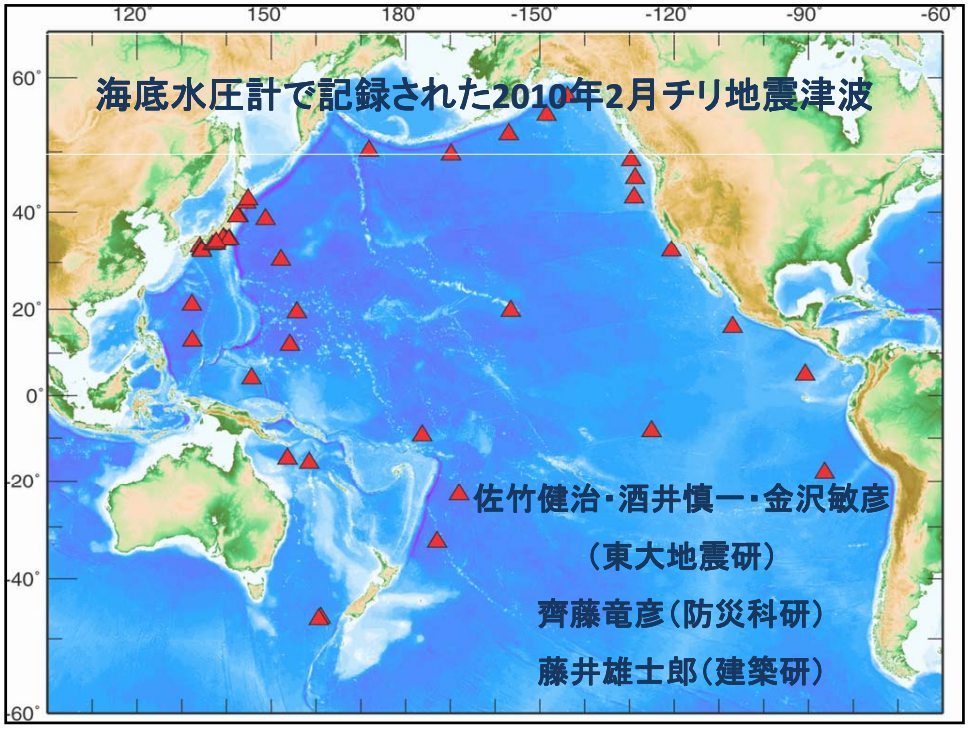
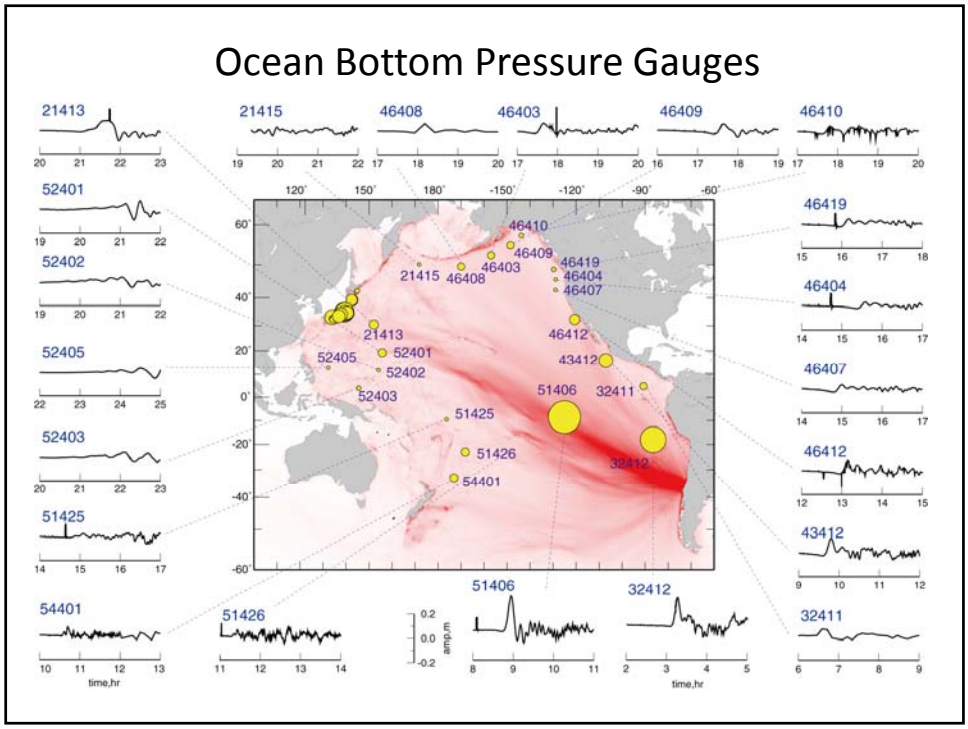
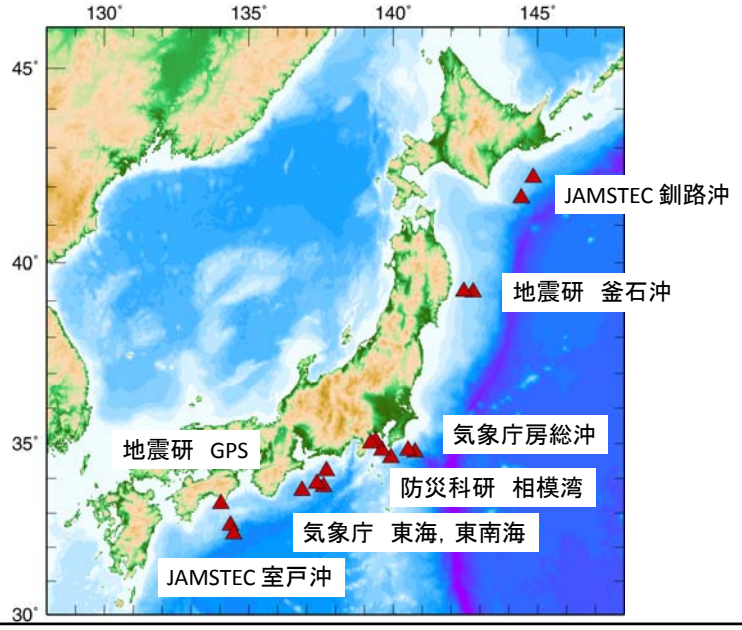
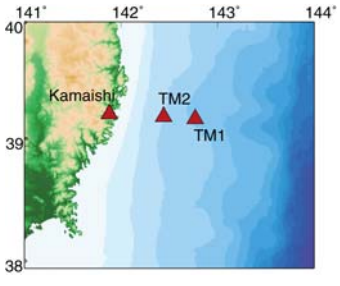

海底水圧計で記録された2010年2月チリ地震津波
佐竹健治・酒井慎一・金沢敏彦
（東大地震研）
齊藤竜彦（防災科研）
藤井雄士郎（建築研）

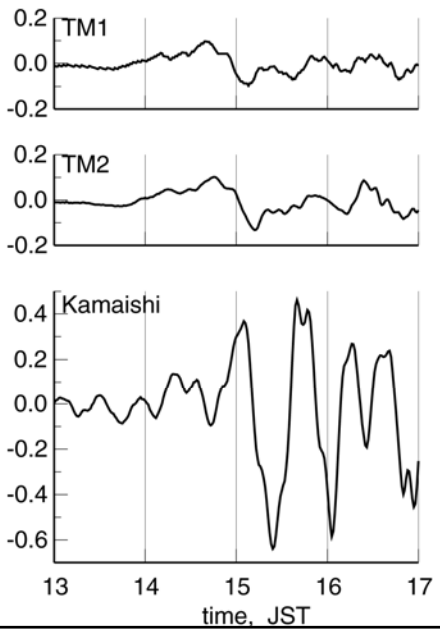

Ocean Bottom Pressure Gauges
21413
21415
46408
46403
46409
46410
52401
52402
52405
52403
51425
54401
51426
51406
32412
46419
46404
46407
46412
43412
32411
time,hr
amp,m

2010 Tsunami observed at BPGs

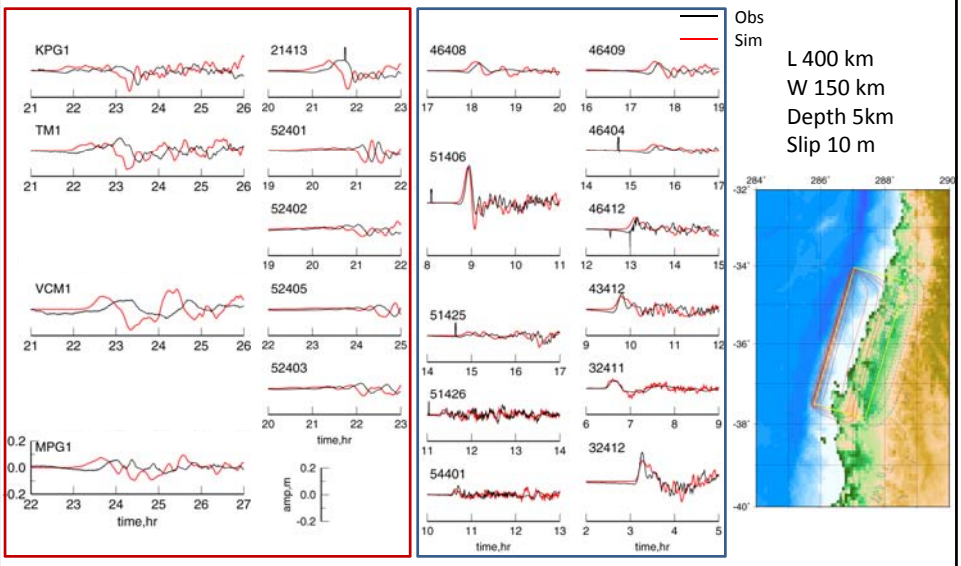


BPGs on Off-Kamaishi Cable





Simulation (Model 1)



Except for NW Pacific stations, the observed waveforms are well reproduced

Model 1 Grid size 5 min, GEBCO, Linear Long-wave with Coriolis

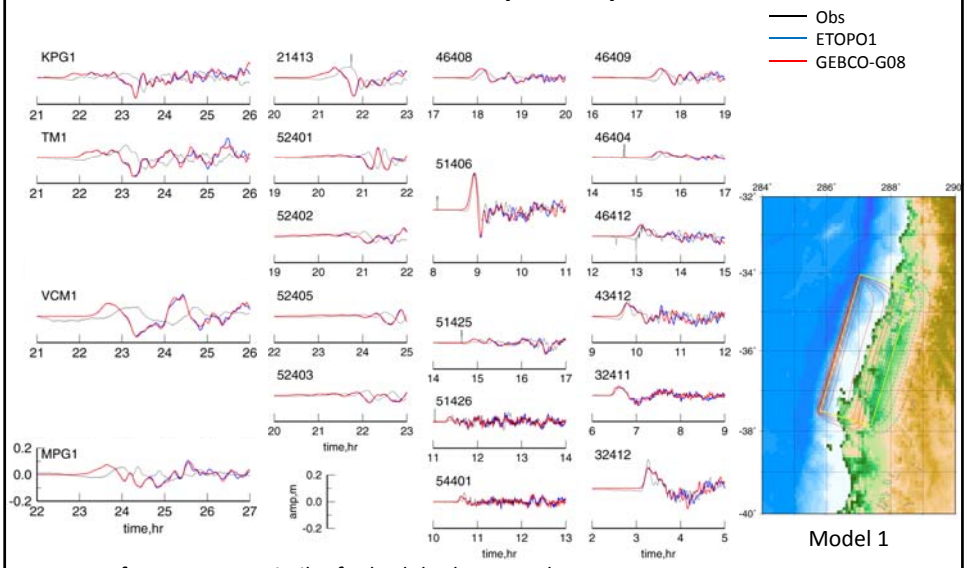
Test for tsunami simulation

Effects of following conditions are examined.
-Bathymetry data (GEBCO G08, ETOPO1)
-Grid size (5 min and 2 min)
-Governing equation (Linear and nonlinear long-wave)
-Governing equation (Long-wave and Boussinesq eq.)
-Governing equation (With and without Coriolis force)

All showed negligible effects on waveforms at tsunameter locations.
Hence we used Linear long-wave equations with 2 min GEBCO data.

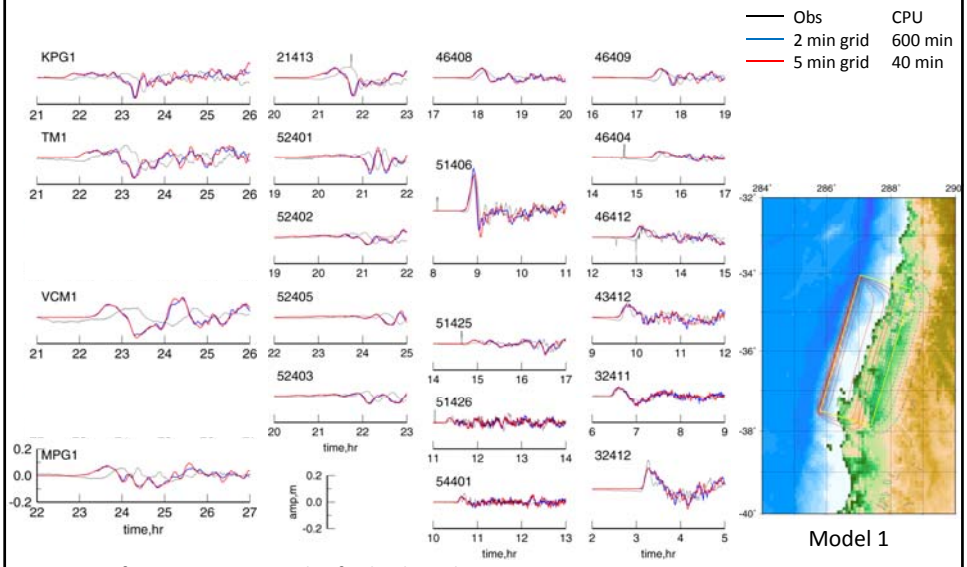
The reason for delayed arrivals at NW Pacific stations are not resolved.

Effects of Bathymetry Data



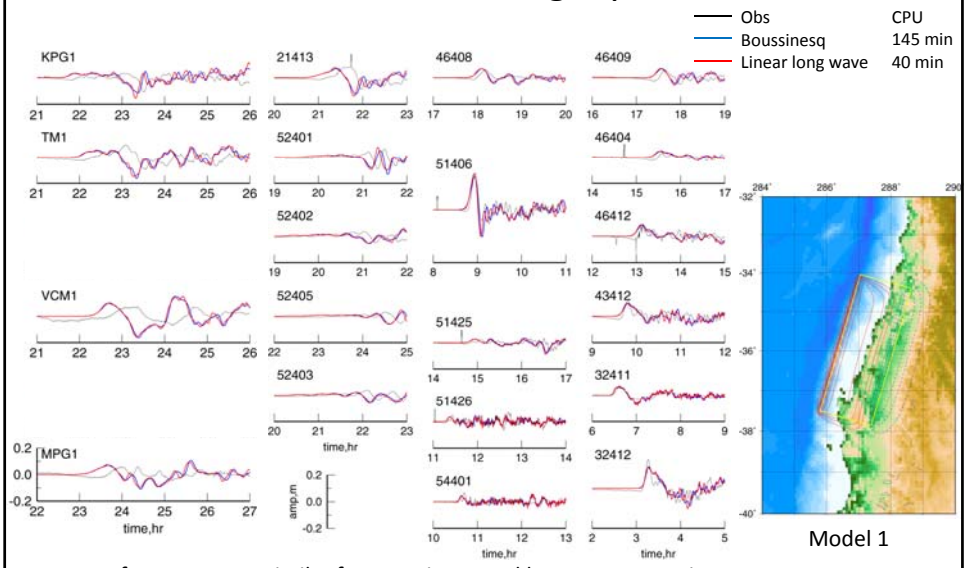
Waveforms are very similar for both bathymetry data sets.
Here we use GEBCO bathymetry data.

Effects of Grid Size



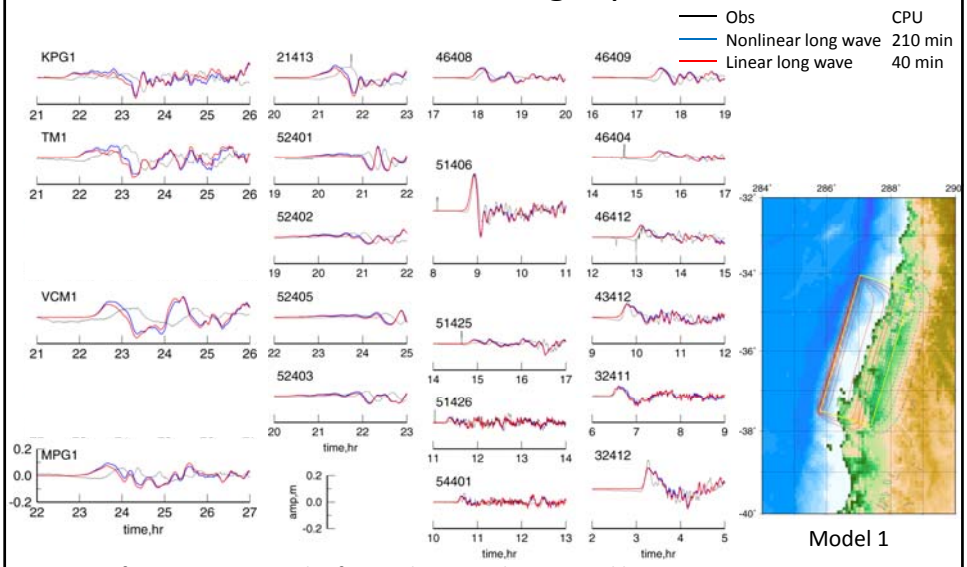
Waveforms are very similar for both grid sizes.
Hence 5 min grid is sufficient.

Effects of Governing Equations



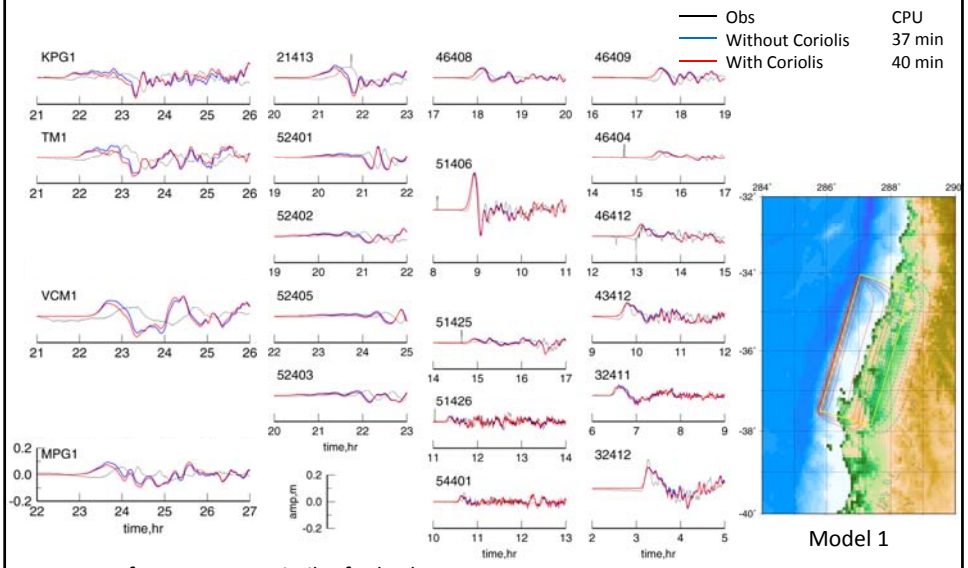
Waveforms are very similar for Boussinesq and long-wave equations
Hence long-wave equation is sufficient.

Effects of Governing Equations



Waveforms are very similar for Nonlinear and Linear and long-wave equations.
Hence linear long-wave equation is sufficient.

Effects of Coriolis Force



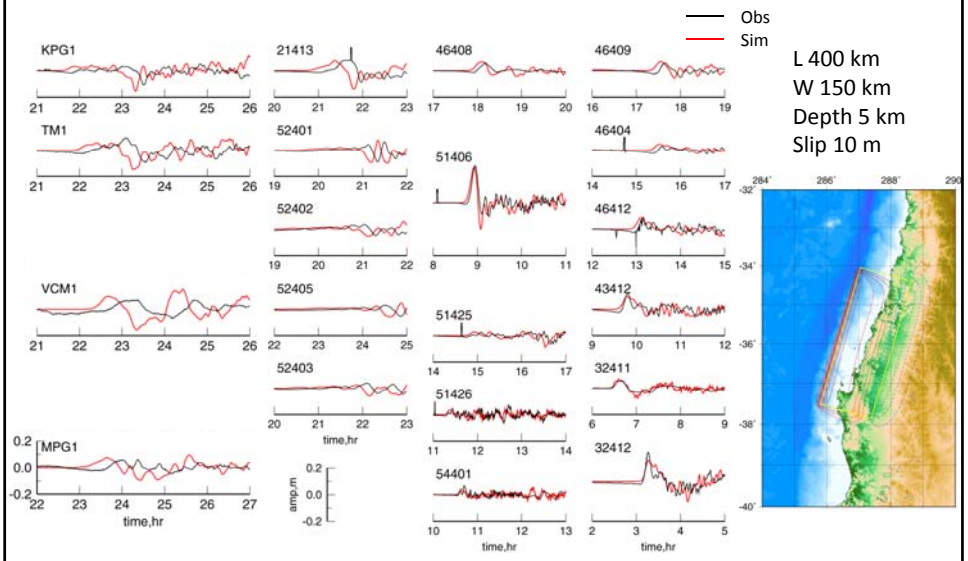
Waveforms are very similar for both cases.
Because the CPU times are similar, the Coriolis force is included.

Forward modeling

Model 1: A 400 km long fault at offshore location (depth 5 km)
similar waveforms to the observed
Model 4: A 600 km long fault at offshore location
earlier arrivals and longer period than the observed
Model 6: A 500 km long fault at offshore location
longer period than the observed

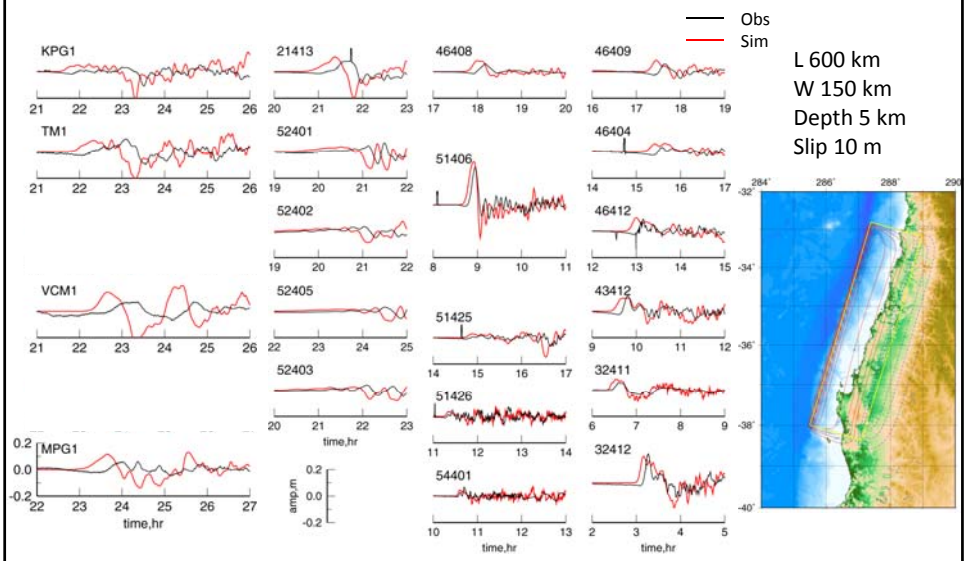
Model 3: A deeper (20 km) fault at offshore location
longer period than the observed
Model 2: A deeper (30 km) fault at coastal location
longer period and smaller amplitude
Model 5: A deeper (50 km) fault at landward location
longer period and smaller amplitude

Simulation (Model 1)



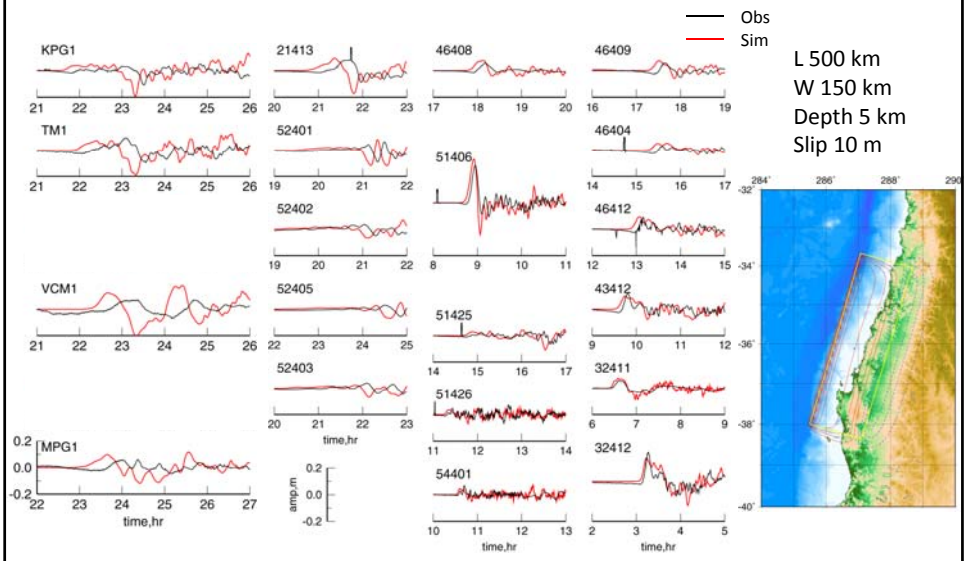
Model 1 The observed waveforms are well reproduced

Simulation (Model 4)



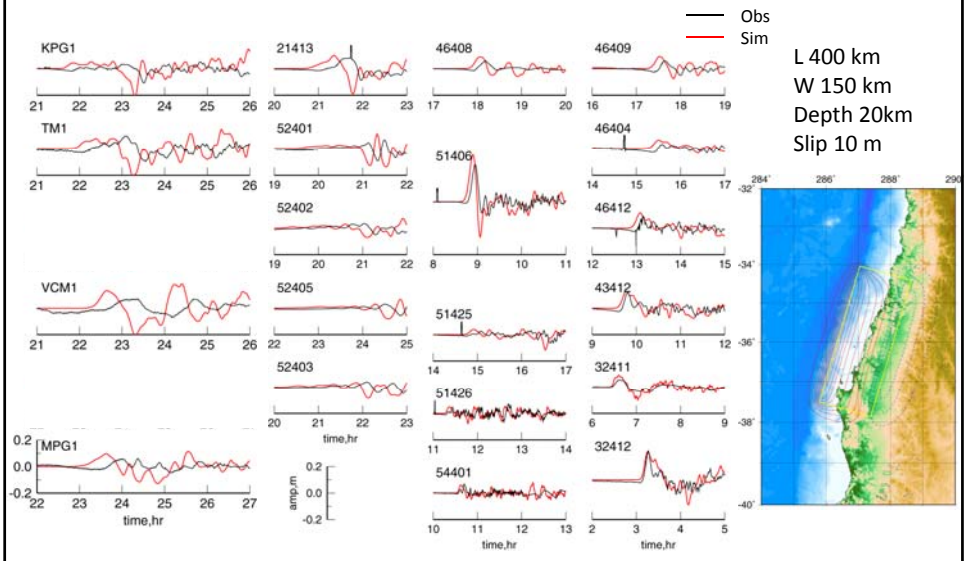
Model 4 A 600 km fault produces earlier arrivals and longer period than the observed

Simulation (Model 6)



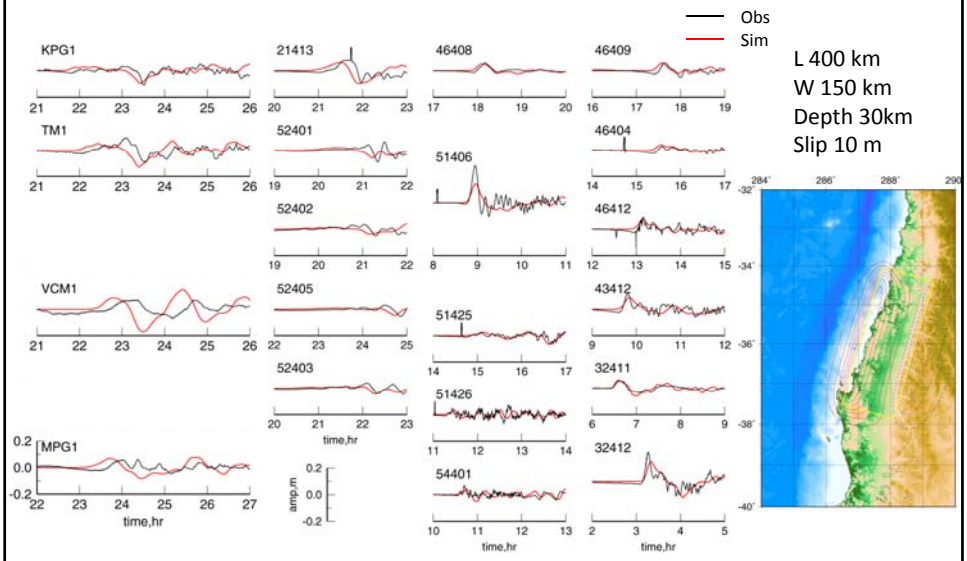
Model 6 A 500 km fault produces longer period than the observed

Simulation (Model 3)



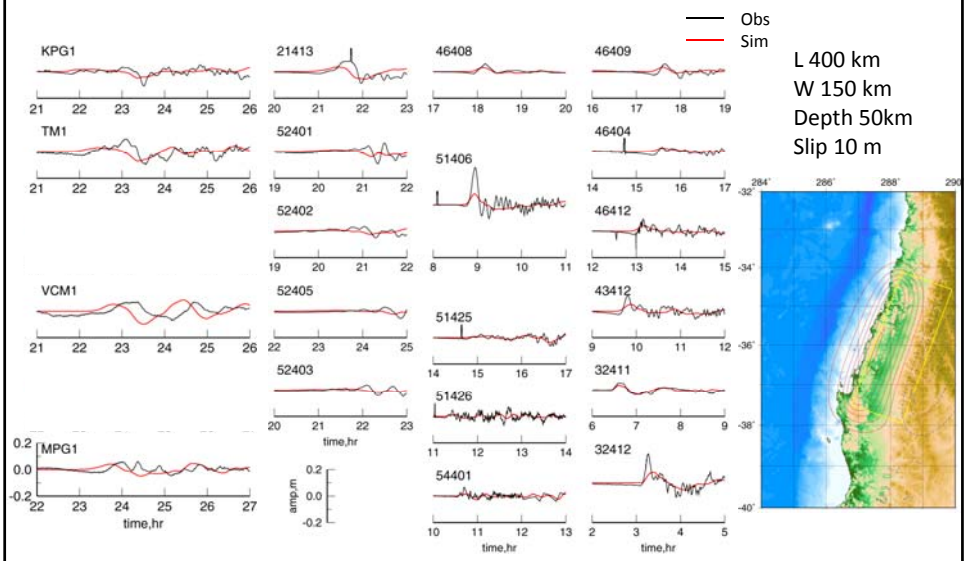
Model 3 A deeper fault at offshore location produces longer period than the observed

Simulation (Model 2)



Model 2 A deeper and coastal fault produces longer period and smaller amplitude

Simulation (Model 5)



Model 5 A deeper and inland fault produces longer period and smaller amplitude