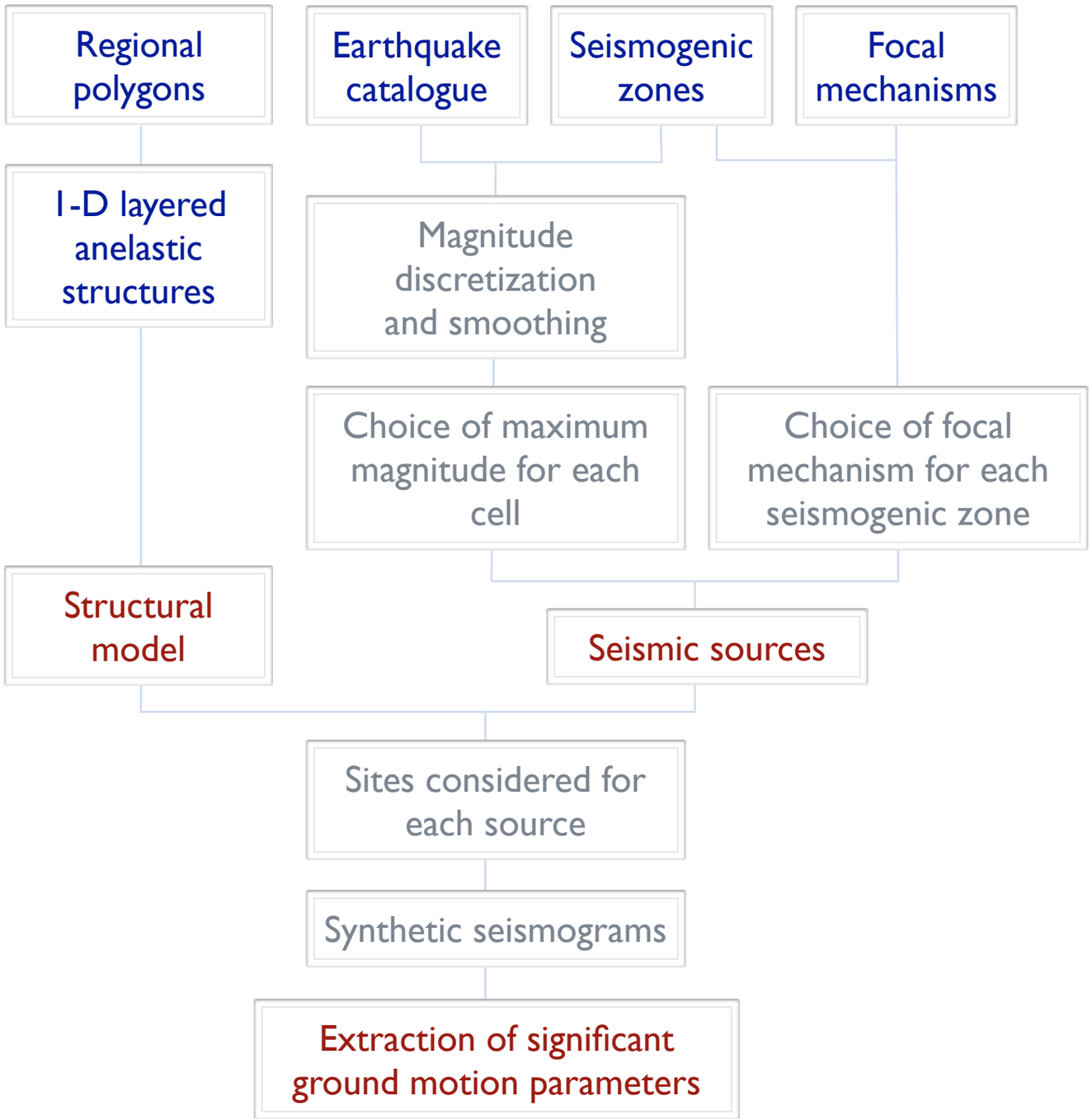
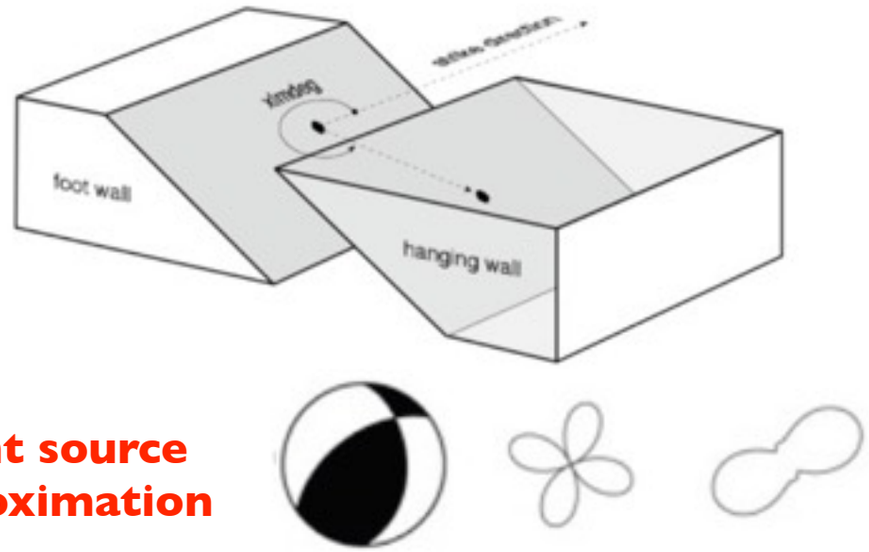
Regional Scale - NDSHA at 10 Hz



- Seismic zonation based on the computation of synthetic seismograms on the nodes of a grid that covers the study area
- Average structural properties
- Kinematic source model
- Cut-off frequency 10 Hz
- Maps of peak displacement, velocity and acceleration

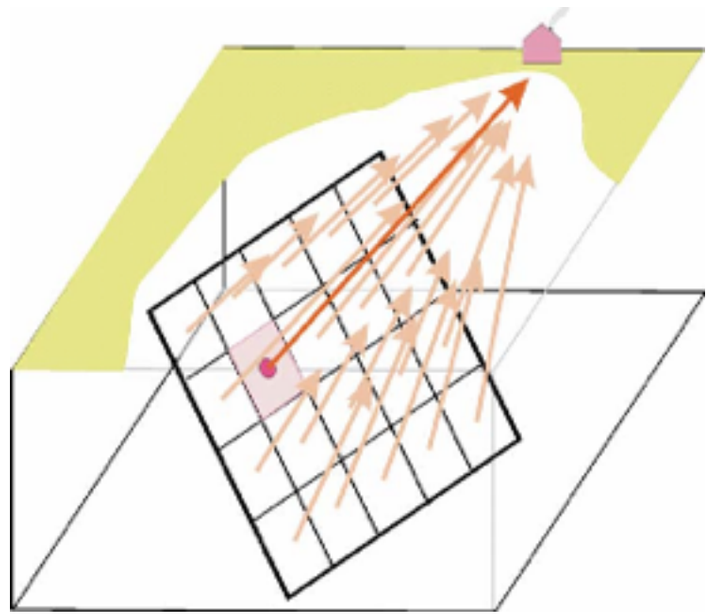
Source models

Point source approximation

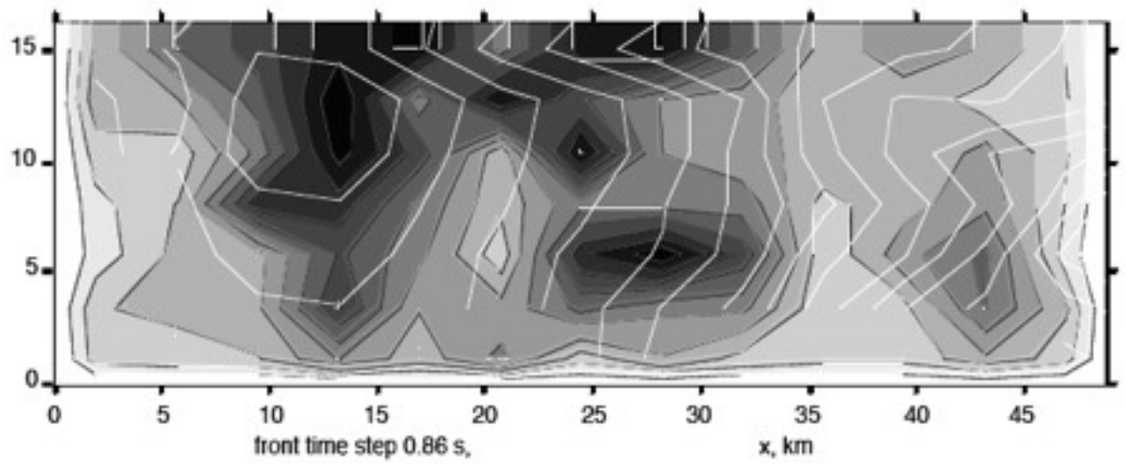


FPS and radiation pattern

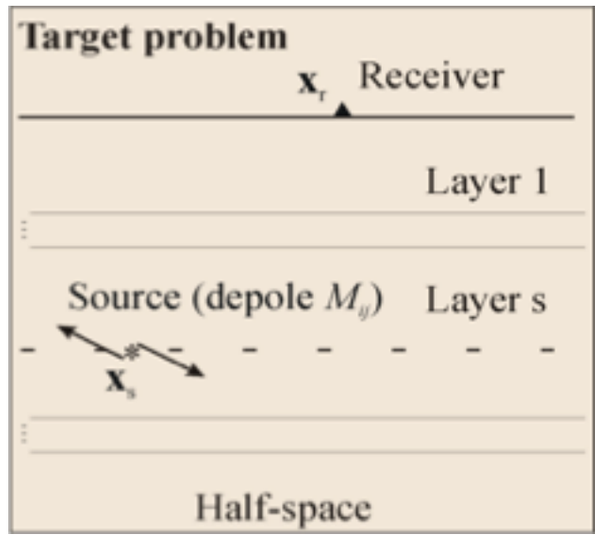
Method DWN (Pavlov, 2002)



Extendend source kinematic model



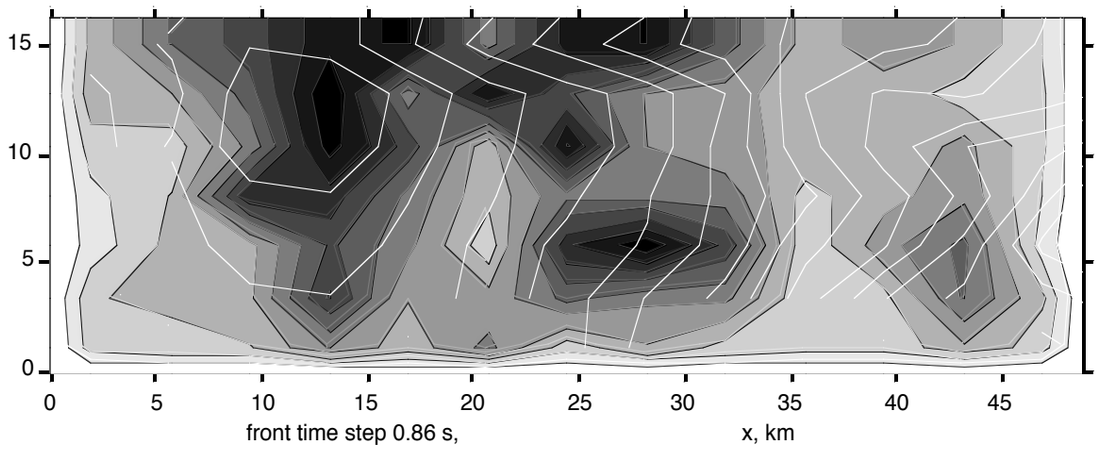
2-dimensional final slip distribution over a source rectangle



Computing time: about 1 hour for a 10Hz signal 40 s long (using 200 sub-sources)

10 Hz - Source definition

Source kinematic model



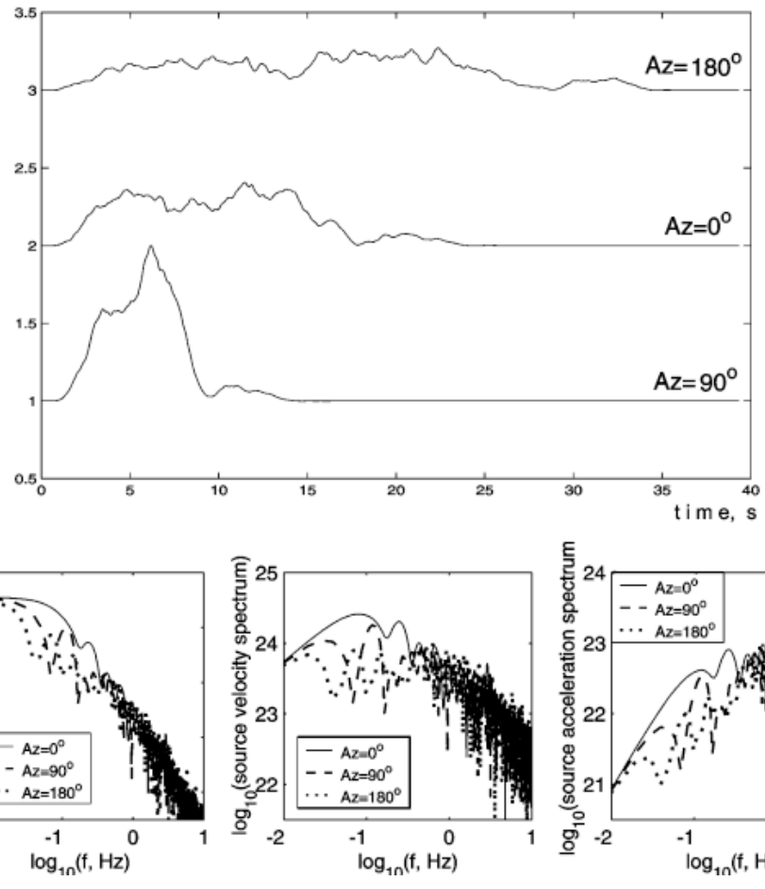
2-dimensional final slip distribution over a source rectangle, shown as a density plot (Mw=7.0).

Rupture front evolution was simulated kinematically from random rupture velocity field.

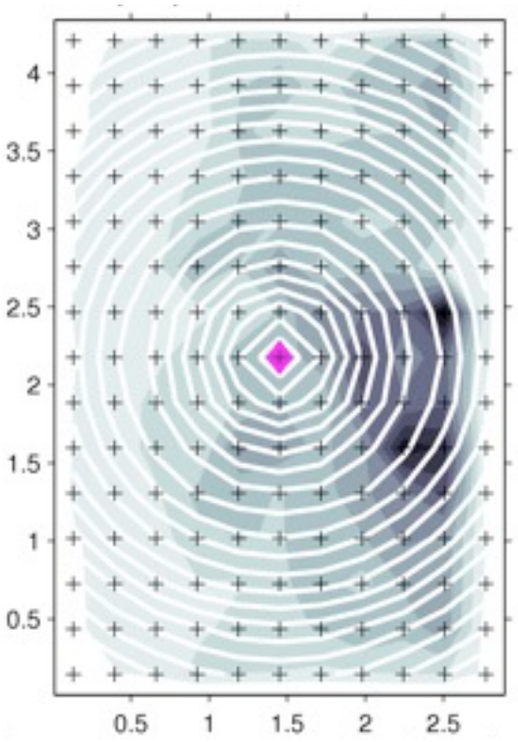
(Gusev, 2010)

Far-field source time histories and their spectra.

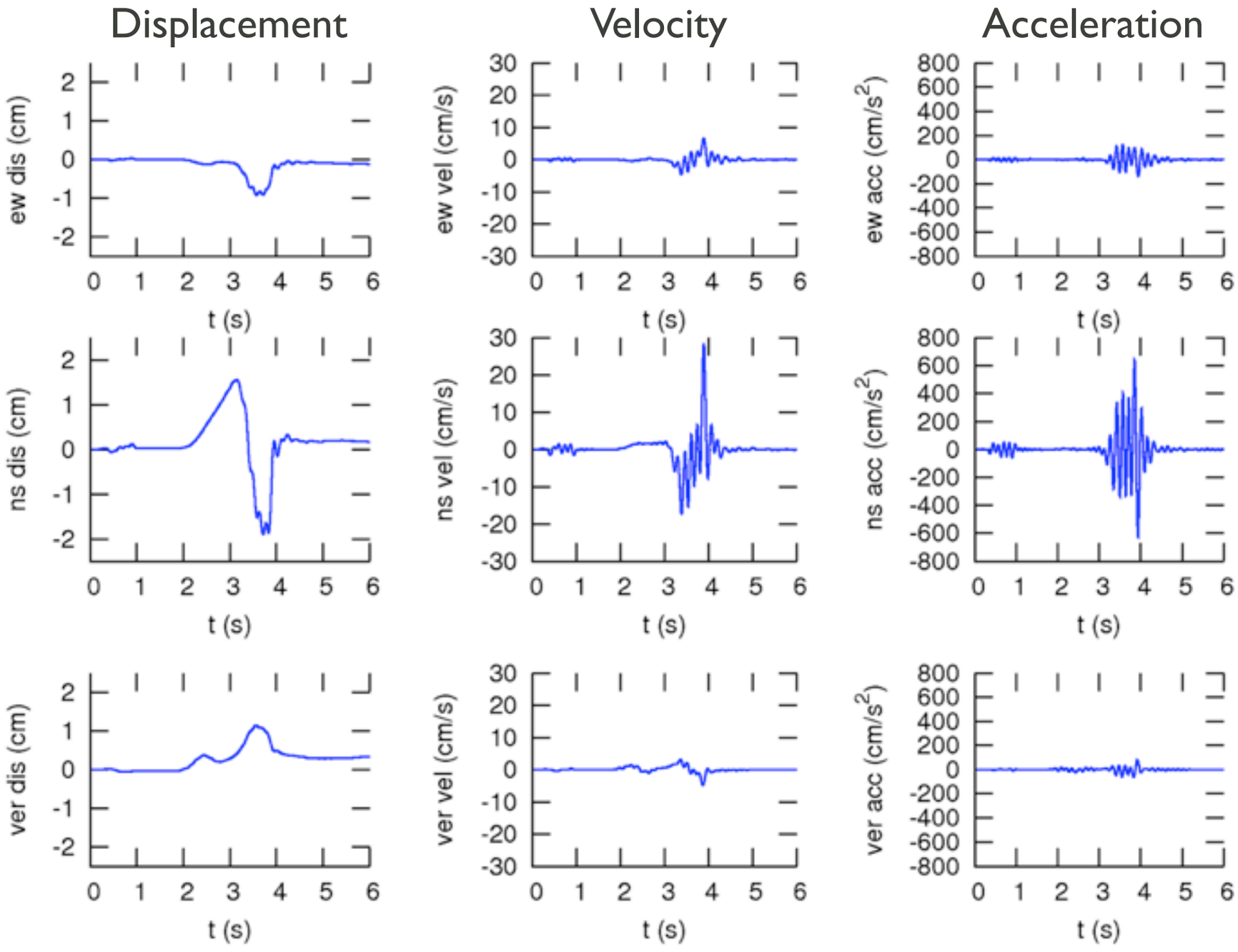
"Displacement" far-field functions (arbitrary scale) for the simulated case of mostly unilateral rupture propagation



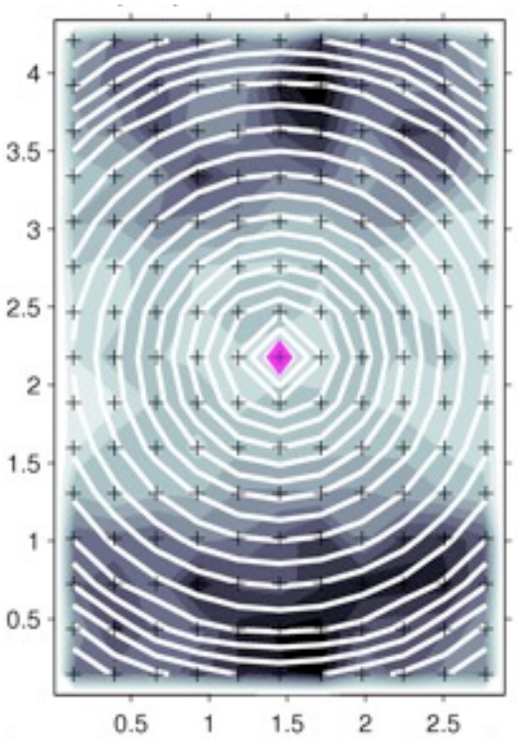
10 Hz - Example 1



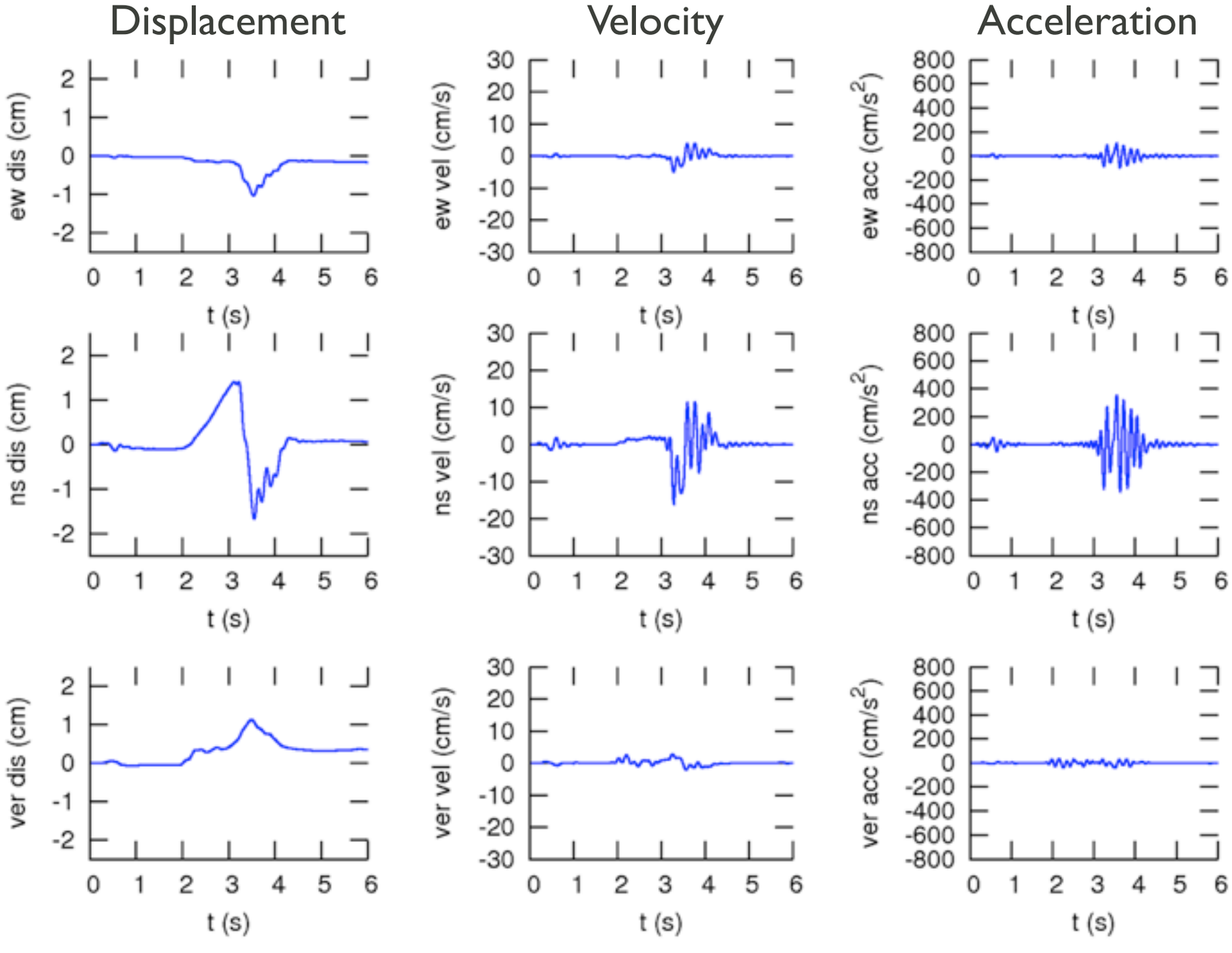
One examples (realization 123) of the 2D final slip function, shown as density over the fault plane. The purple square is the nucleation point. White contours are successive rupture front positions, simulated kinematically from random rupture velocity field. Crosses are positions of point subsources.



10 Hz - Example 2



One examples (realization 155) of the 2D final slip function, shown as density over the fault plane. The purple square is the nucleation point. White contours are successive rupture front positions, simulated kinematically from random rupture velocity field. Crosses are positions of point subsources.

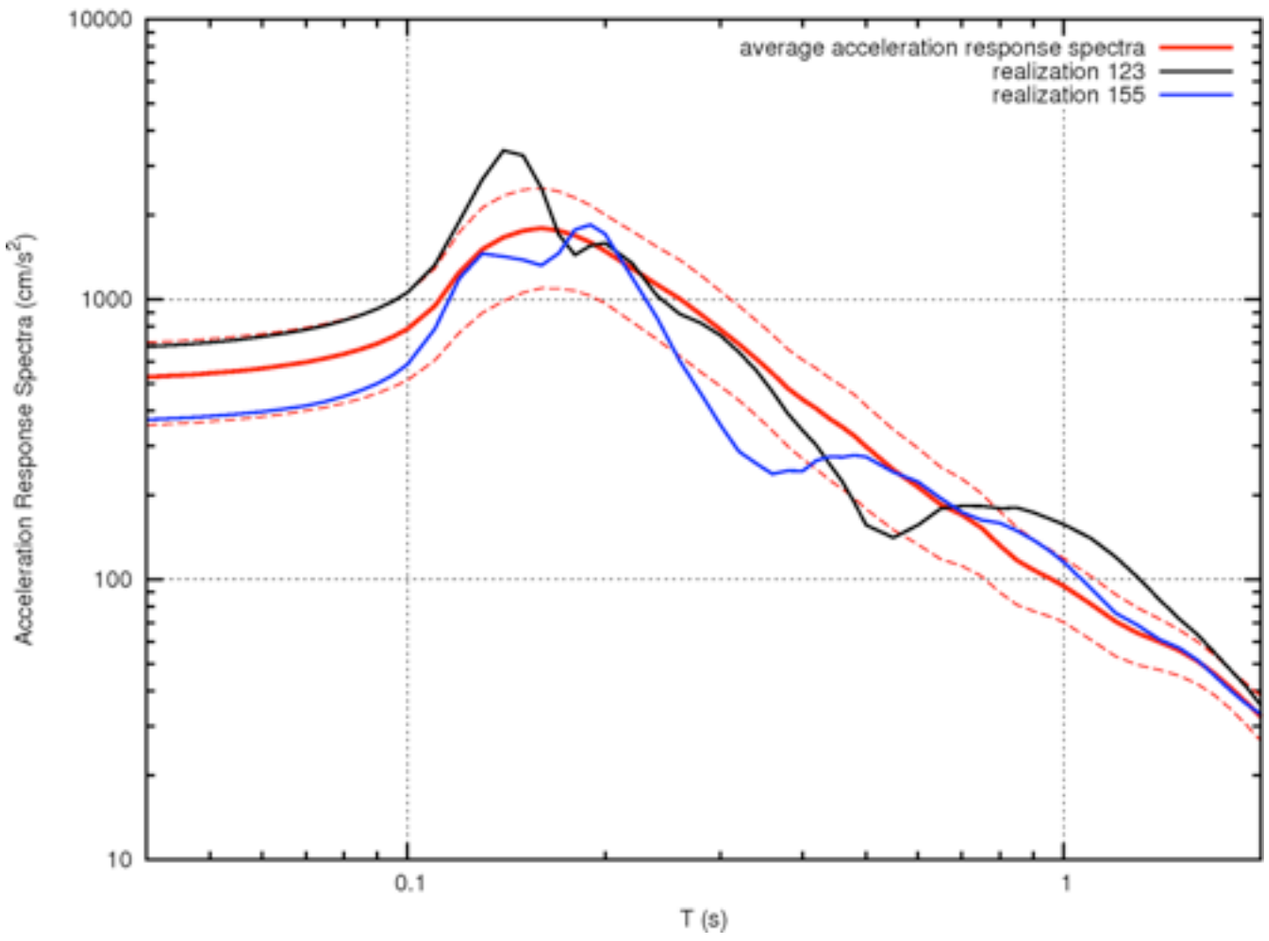


10 Hz - Dispersion of results

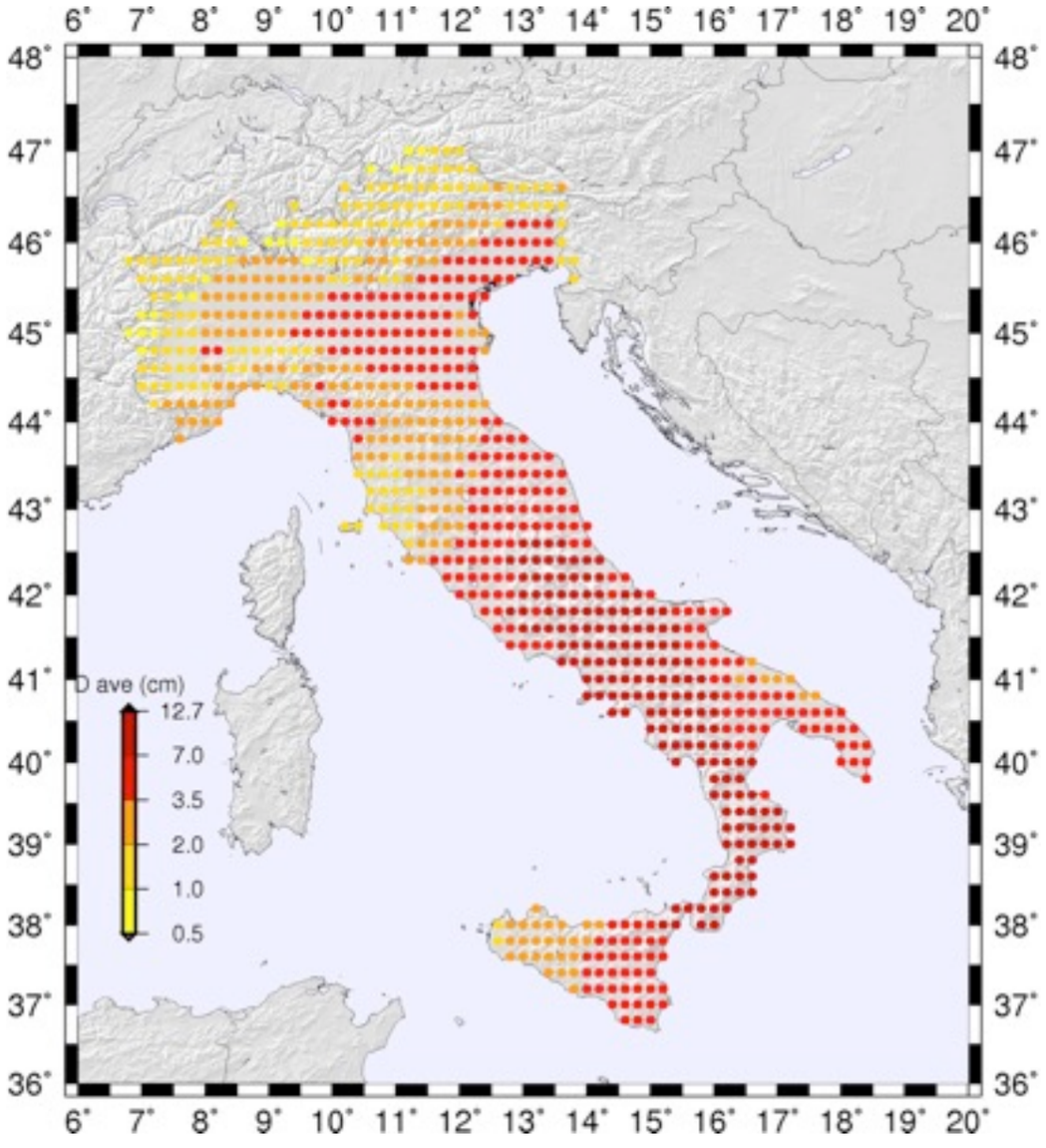
	E-W		N-S		Z	
	mean	σ	mean	σ	mean	σ
PGD (cm)	0.9	0.1	1.7	0.2	1.0	0.1
PGV (cm/s)	5.7	1.6	20	6	3.2	0.8
PGA (cm/s^2)	142	49	501	163	63	20

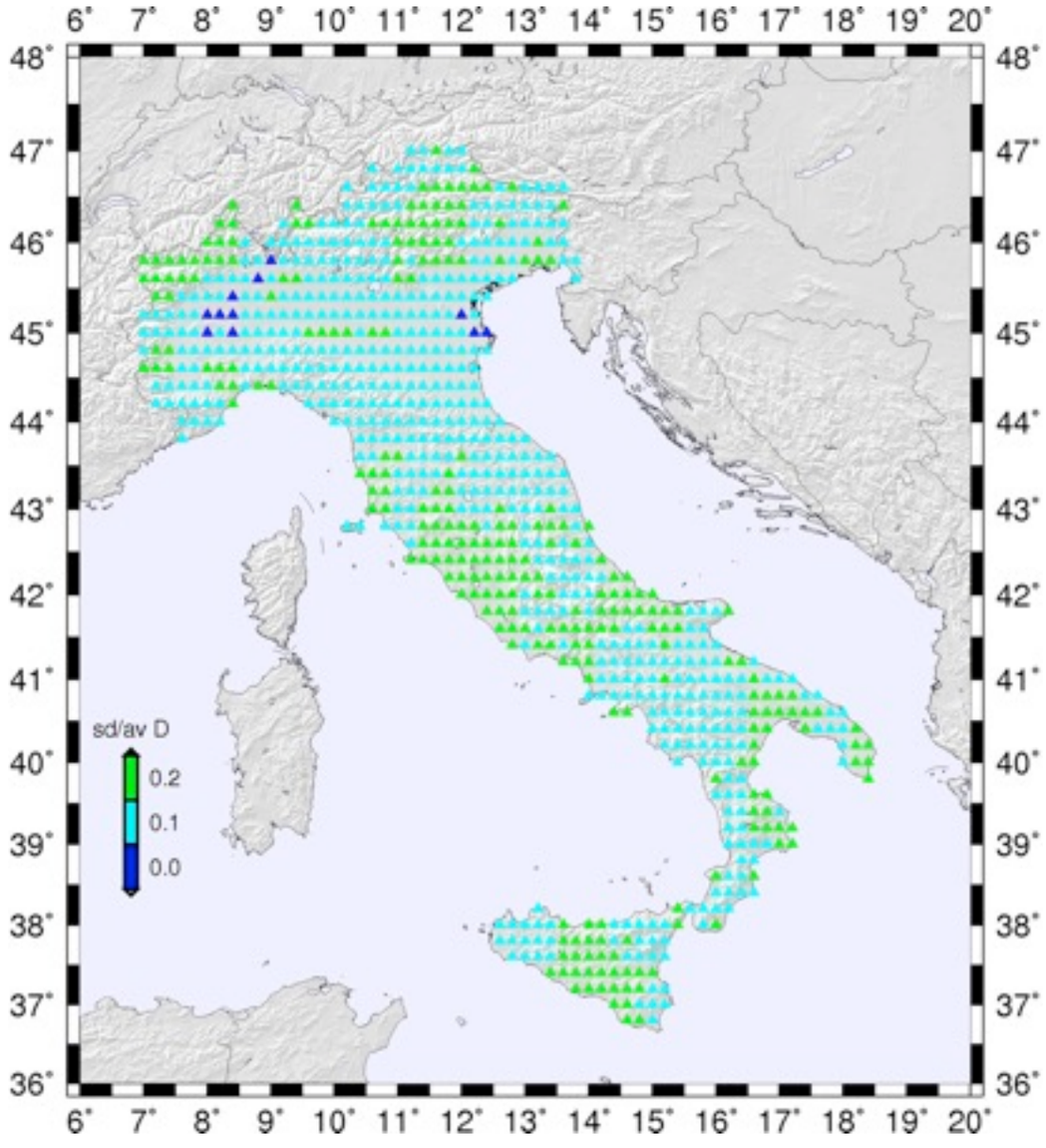
Average and standard deviation of the peak values for 200 different random realizations of the same source model.

Average and standard deviation of the acceleration response spectra (damping 5%) for 200 different random realizations of the same source model and examples of response spectra for two different realizations.



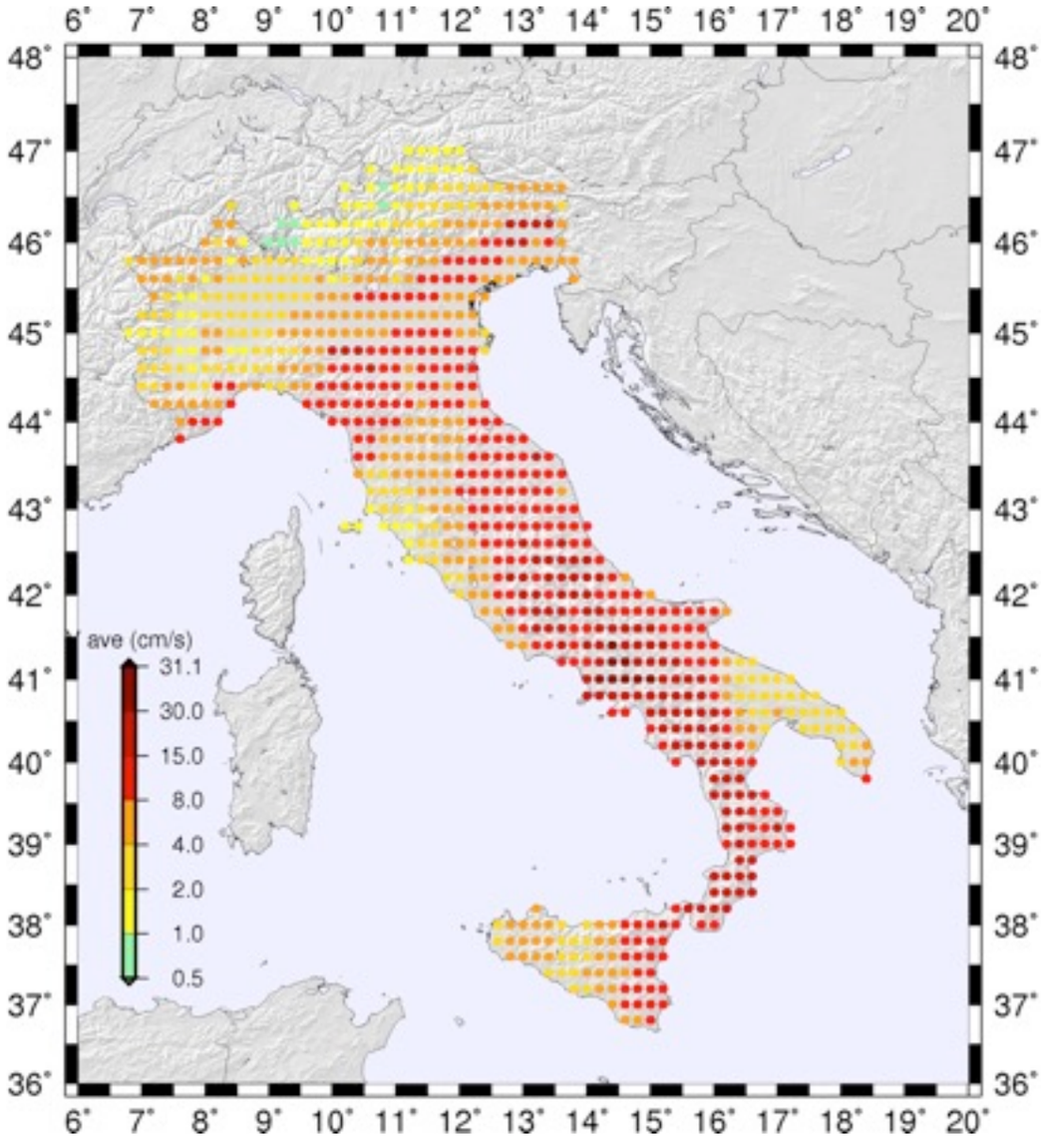
Preliminary results

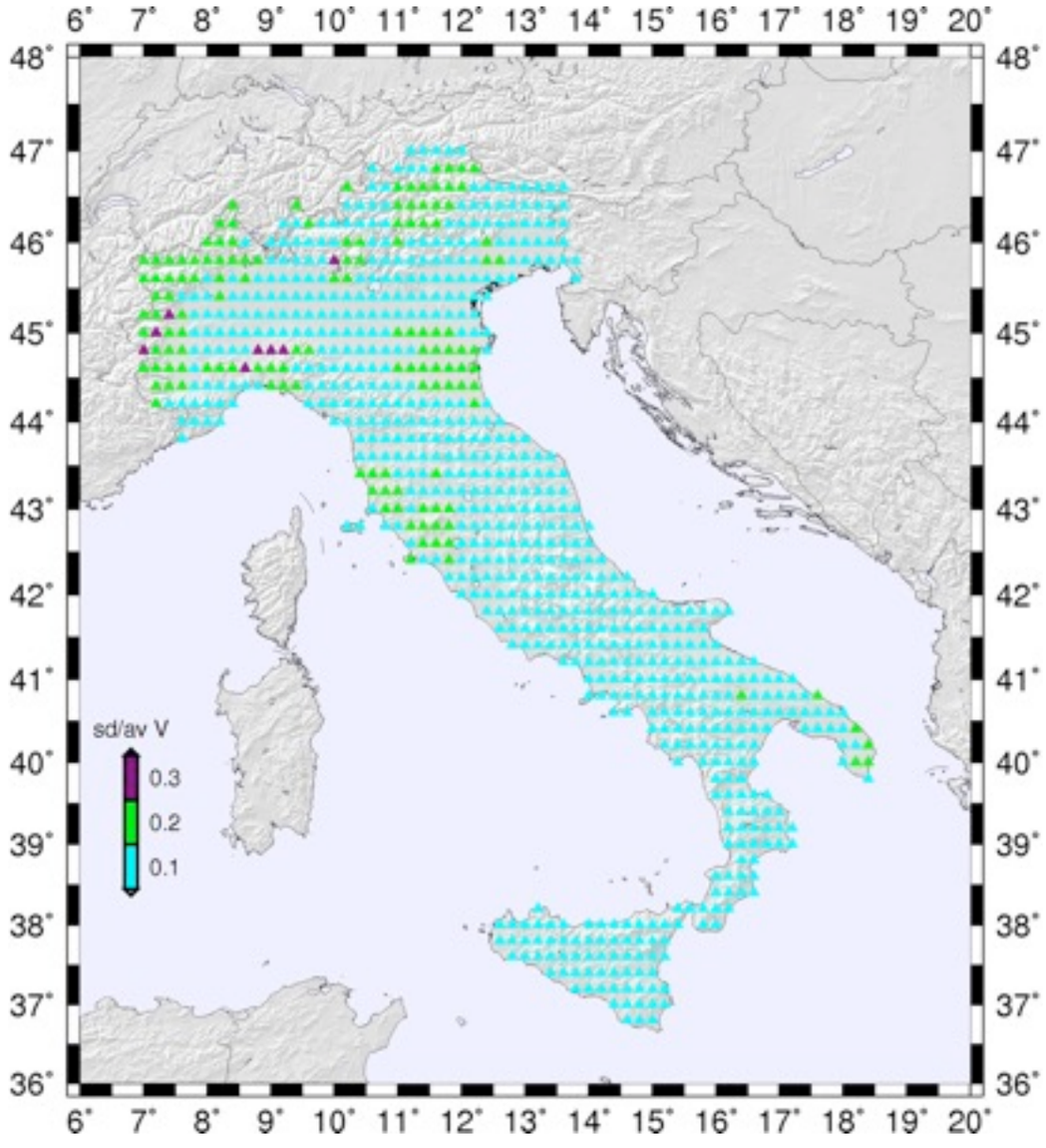




Maps of average of PGD (peak ground displacement) on different random realizations of source model (left) and variability of the PGD in terms of ratio between standard deviation and average of the maximum peaks at each receiver.

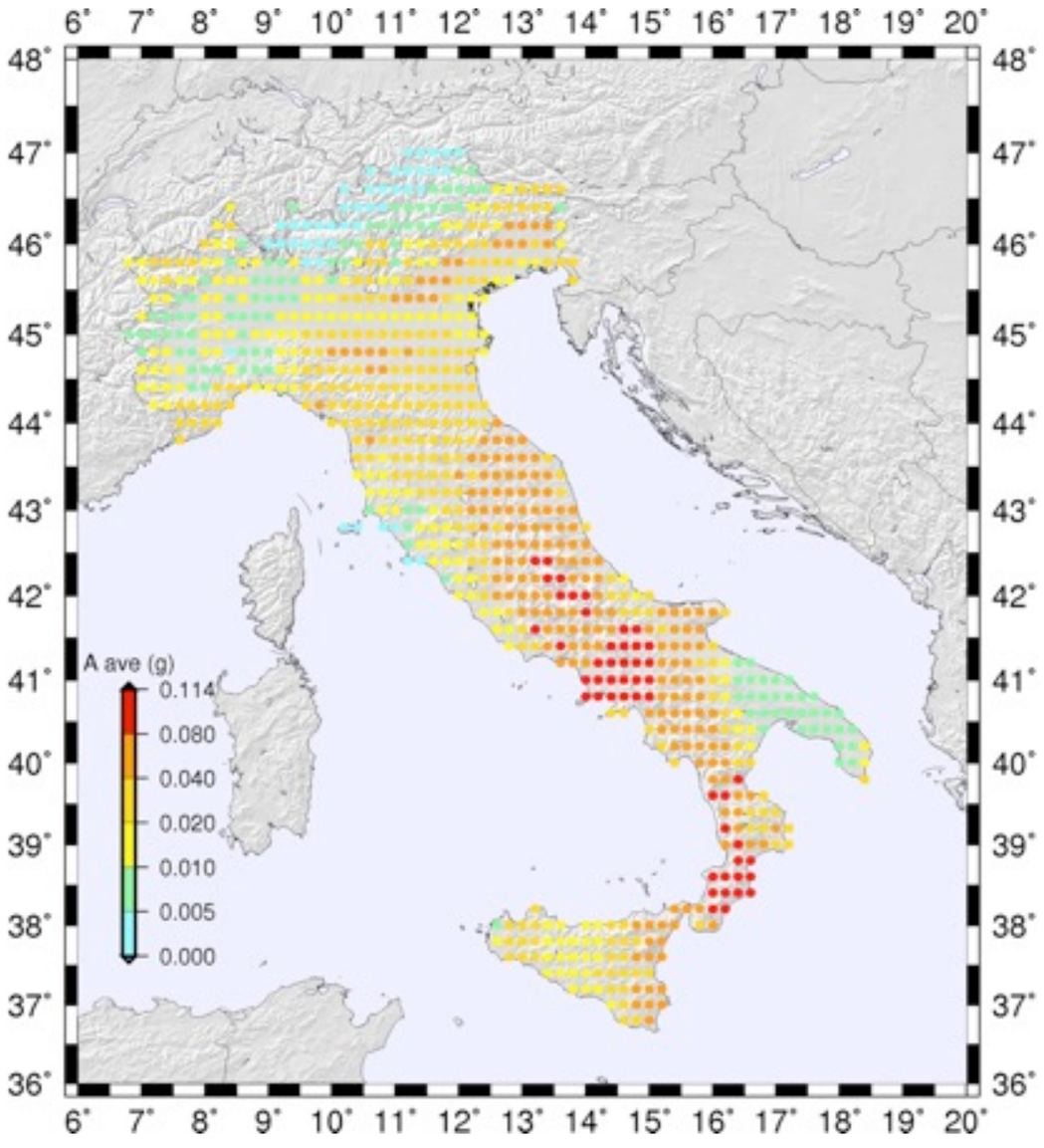
Preliminary results

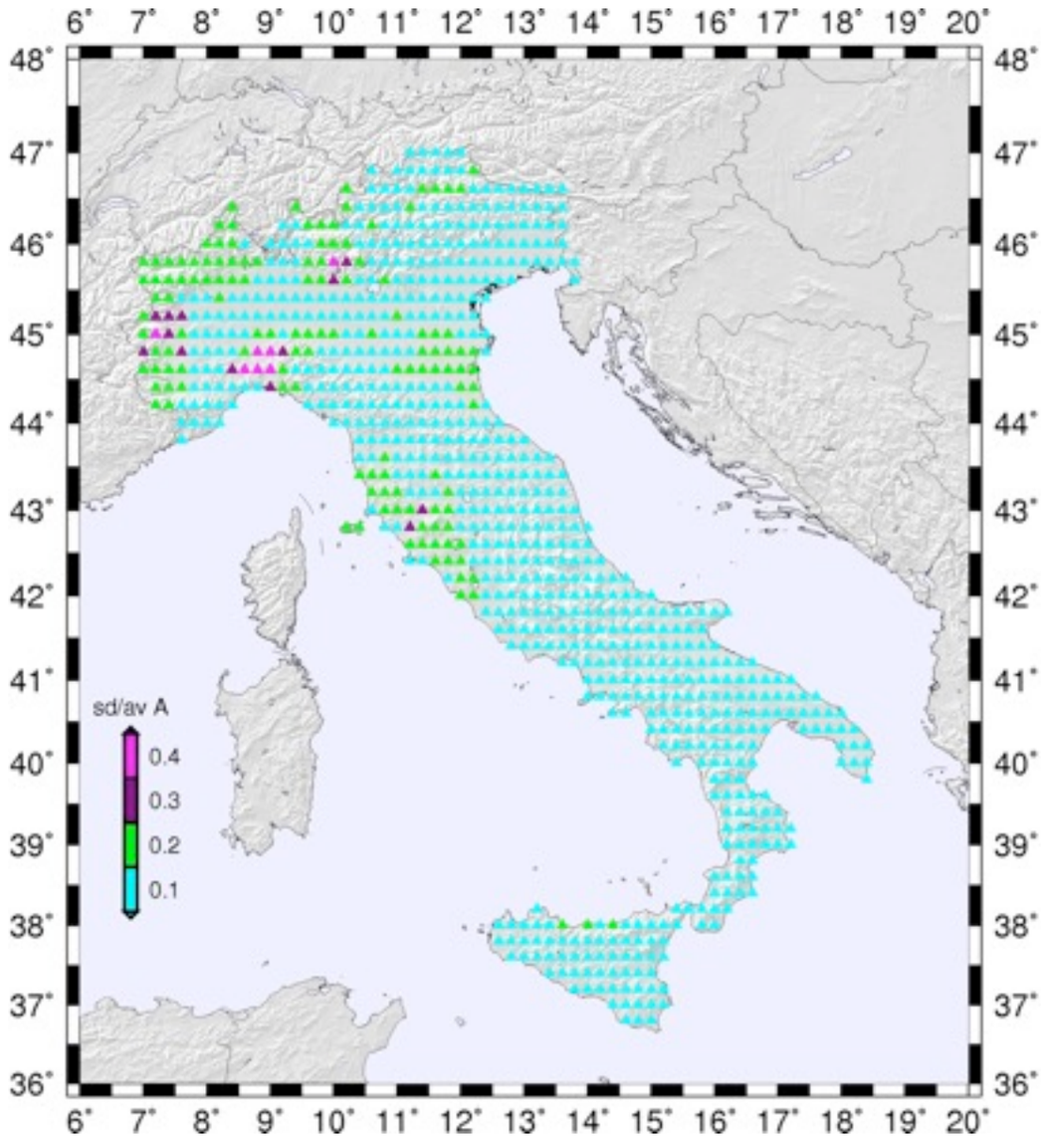




Maps of average of PGV (peak ground velocity) on different random realizations of source model (left) and variability of the PGV in terms of ratio between standard deviation and average of the maximum peaks at each receiver.

Preliminary results





Maps of average of PGA (peak ground acceleration) on different random realizations of source model (left) and variability of the PGA in terms of ratio between standard deviation and average of the maximum peaks at each receiver.

Conclusions and future perspectives

- The performance of the package over the grid in terms of computational time and number of successful jobs were tested and submission of job and retrieval of its output were refined
- The test runs on the random component of the source gave an indication on the effective number of jobs that must be computed to have a good estimate of the distribution of the ground shaking peaks at each receiver
- The first runs have provided a preliminary evaluation of the uncertainty of the hazard maps due to the random representation of the source
- Porting of other packages
- Application within the project “Definition of seismic and tsunami hazard scenarios by means of indo-european e-infrastructures” funded by Regione Friuli Venezia Giulia