Geophysical Research Abstracts, Vol. 7, 06469, 2005
SRef-ID: 1607-7962/gra/EGU05-A-06469

Numerical modeling of the ground motion produced by the 1887 off shore Wetern Liguria earthquake

Frisenda M [(1)] **, Madariaga R**[(2)] **, Chavez M**[(2,3)]**, Eva C.** [(1)]

(1) DIP.TE.RIS, Dipartimento per lo studio del territorio e delle sue risorse, Viale Benedetto XV,5, 16132 Genova Italy, (2) Laboratoire de Geologie, UMR CNRS 8538, Ecole Normale Superieure, 24 Rue Lhomond, 75231 Cedex- Paris France, (3) Institut of Engineering, UNAM, Mexico City, Mexico

We use a 3D Finite difference numerical method to model the generation and propagation of seismic waves for off-shore earthquake using as reference one the 1887 Western Liguria event. The propagation, in this case, is strongly affected by the crustal model which is characterized both by the presence of a significative variation of the bathymetry, the presence of a thin sedimentary layer and a water layer. The 3D model of the crustal structure was derived from previous geophysical exploration of the Ligurian Sea and the Ligurian margin. Wave propagation was computed using a finite difference method that solves the complete 3D seismic wave propagation equations accurate to the second order in time and to the fourth order in space. The maximum resolved frequency for the simulations is 4 Hz and we used a fault dimension of 20x17 Km located about 20 km off shore. The simulated earthquake had an equivalent magnitude of Mw=6.3 in all our simulations.

The results show that the bathymetry and the sedimentary layer produce a strong focusing of the seismic waves and therefore produce remarkable amplification effects in the coastal areas, close to the Ligurian sea. Those effects are concentrated near the shore, near those areas where the sediment layer comes to the surface, and this could explain the reason of the very heterogeneous pattern of damage distribution reported by the macroseismic map of the 1887 event. Another interesting result form our simulations is that ground motion is strongly affected by the distribution of the slip on the fault (asperities). The response spectra calculated for different points along the Ligurian coast show very variable amplitudes depending on the particular asperity distribution.