

Geophysical Research Abstracts
Vol. 13, EGU2011-9781, 2011
EGU General Assembly 2011
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Three-dimensional seismic ground motion modelling in Lower Tagus Valley from Finite difference simulations

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Throughout its history the Lower Tagus Valley (LTV) has been struck by several earthquakes which produced important material damage and loss of lives: The 1st of November 1755 Lisbon earthquake and the 1969 earthquake ($M_w=7.3$), located in the SW Iberia Margin and the 1344, 1531 and 1909 (magnitudes ranging from 6 to 7) with epicenter located inside the basin. Since this region is the most highly populated region in Portugal, it is expected that an earthquake of similar magnitude of those that have occurred in the past will cause an enormous destruction and casualties. To contribute to an improved assessment of the seismic hazard in the Lower Tagus Basin we introduce a realistic method on the prediction of seismic ground motion produced by moderate to large earthquakes in this area. This process involves the establishment of a structural 3D model, the evaluation of seismic potential of the faults in the studied area, and finally, a three-dimensional seismic ground motion modeling based on Finite Difference Methods. After that, using appropriated relations between seismic intensity (MMI) and PGV we computed the synthetic isoseismic maps. By comparing these results with available seismic intensities it is possible to evaluate the realism of the different proposed sources. This study gives new insights on the seismic risk in LTV and will help to identify the regions that are most exposed to strong ground motions.