Geophysical Research Abstracts, Vol. 8, 03456, 2006
SRef-ID: 1607-7962/gra/EGU06-A-03456

Wave Propagation from Intermediate Depth Earthquakes - the Vrancea Example

J. Miksat, F. Wenzel and V. Sokolov
Karlsruhe University, Germany (joachim.miksat@gpi.uni-karlsruhe.de)

The Vrancea region in Romania produces approximately three intermediate depth earthquakes with $M_w \geq 7.2$ per century. These earthquakes have a large impact on Romania, especially on the capital of Bucharest, and the neighbouring countries. In the frame of the CRC 461 'Strong Earthquakes' funded by the DFG (German Research Foundation), we develop a modeling method in order to understand the observed ground motions of past events and to calculate ground motions for potential future Vrancea strong earthquakes.
We use a 2.5 Finite-Difference method to model wave propagation from the hypocenter to the surface and we implement the low velocity surface layers by applying frequency dependant site amplification factors. The used subsurface structure is based on deep seismic sounding, refraction tomography, receiver functions analysis and seismic tomography. The main features of the model are the Carpathians, the deep sedimentary foreland basin and a subducted lithosphere beneath the SE Carpathian Arc. To implement the scattering properties of the region, stochastic velocity perturbations with correlation lengths between 2 km and 5 km and RMS velocity perturbations of 3 % to 5 % are included into the model. Wave propagation up to 4.5 Hz is modeled for several 350 km wide and 90 to 130 km deep 2D slices, which are rotated around the epicenter-hypocenter axis. This allows the calculation of ground motions for the whole surface of the region. We model the 1986 M_w=7.1 and the 2004 M_w=6.0 events and compare modeled and real seismograms, Fourier amplitude spectra and PHA maps. Additionally, the modeled seismograms are translated into macroseismic intensities to make the modeling results comparable with the observed intensity distributions.
We can show that the modeling reproduces the observed ground motions of the 1986 and 2004 earthquakes. Therefore, the developed modeling method is capable to simulate ground motions for potential future Vrancea strong earthquakes.