



Map of probabilistic seismic hazard assessment for Bulgaria as a basis for a new building code

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Seismic hazard maps as part of a new building code for Bulgaria with respect to EUROCODE 8 require a unique hazard parameter, such as macroseismic intensities, for probabilities of exceedance of 10% in 10 years (recurrence period of 95 years) and of 10% in 50 years (recurrence period of 475 years). We computed the seismic hazard with EQ-RISK. We used the earthquake catalogues for Central and Southeastern Europe (342 BC - 1990 AD), for Bulgaria (1981 – 1990) and for Greece (550BC-2004). The most consuming work was to establish a unified catalogue.

Seismic source zones inside an area of about 200 km around Bulgaria were based on seismicity, neotectonics and geological development. Fore- and aftershocks have been removed considering the ten day criteria. For each seismic source the intensity-frequency relation was calculated and a maximum possible earthquake as well as a seismogenic depth has been estimated. An appropriate intensity attenuation law was assumed. At all grid points contributions of all seismic sources are summed up to the annual probability of exceedance.

To cope with the irregular isoseismals of the Vrancea intermediate depth earthquakes we followed a method described in Ardeleanu et al. (2005). Using detailed macroseismic maps of three intermediate depth earthquakes, an additional absorption coefficient to the attenuation law has been calculated for each observation.

To establish the intensity-frequency relations we used two methods, for each region separately. In one we estimated the time of completeness above a lower bound inten-

sity. Alternatively for each intensity we estimated the corresponding time of completeness and calculated the annual frequency. For few regions, the effects of both methods on seismic hazard are slightly different, less than half an intensity and depending on the recurrence period.

Besides the two seismic hazard maps mentioned at the beginning, additional calculations have been done for a recurrence period of 10,000 years. In Bulgaria the region with the strongest earthquakes and also with the highest seismic hazard is the Kresna region south of the capital Sofia.

Ardeleanu, L., Leydecker, G., Bonjer, K.-P., Busche, H., Kaiser, D. & T. Schmitt (2005): Probabilistic seismic hazard map of Romania as a basis for a new building code. - *Natural Hazards and Earth System Sciences*, 5, 679 – 684.