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STRONG MOTION ATTENUATION MODEL FOR CENTRAL EUROPE

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The seismicity in Switzerland is in general moderate, but strong earthquake can not be excluded in certain regions. The earthquake catalogue shows more than 300 earthquakes with intensities greater than V for the last 200 years. The strong ground motion expected for an earthquake with magnitude greater than 5,0 should consequently be considered in the design of structures. Attenuation laws of strong ground motion play therefore a key role in the seismic hazard assessment and developing of seimic design criteria. However the lack of strong motion data from earthquakes in Switzerland makes it difficult to develop sufficiently reliable attenuation functions. The increasing number of waveforms from well-calibrated digitally recording seismograph stations allows to use these data for engineering applications.
Between 1985 and 1994, 1'915 earthquakes with magnitudes between 2,0 and 5,0 were observed in Switzerland and the surrounding area. During the same period 52'772 vertical velocity time series have been recorded with the seismograph network of the Swiss Seismological Service. Based on these recordings which were completed by 52 acceleration time series from the Swiss national strong motion network, 7'350 instrument corrected Fourier acceleration spectra from 124 earthquakes were extracted and employed to predict the Fourier acceleration spectra and peak ground acceleration of ground motion.
The frequency dependent correlation coefficients of the attenuation model for the Fourier acceleration spectra of vertical ground motion were calculated by means of a two step regression analysis. The general shape of the spatial attenuation of the Fourier acceleration spectra of ground motion are between 1Hz and 5Hz in good accordance with corresponding European attenuation models. The spectral amplitudes obtained in the upper frequency range however are higher with respect to the spectral amplitudes from other European attenuation models, because the model was calibrated with data from the lower magnitude range.
The ratio between horizontal and vertical spectral ground acceleration shows an appreciable scatter with mean values between 1,2 and 1,6.
The predicted values of spectral ground accelerations and peak ground accelerations are in good agreement with observed data from strong earthquakes in Europe.
Although the predicted mean values are reliable, they may be improved by increasing the size of input data, especially with ground motion data in the nearfield of the earthquake sources and in the upper magnitude range.

KEYWORDS

attenuation model; spectral ground acceleration; peak ground acceleration; seismograph data; low seismicity region; Switzerland.