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Nonlinear site effects in real time shakemap generation as part of risk reduction

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There are well known the ground motion uncertainties:(i)-aleatory uncertainties in random effects and ,(ii)-epistemic uncertainties in knowledge. The fundamental understanding about both uncertainties in ground motion comes from the large scatter in observations, even when they are normalized by magnitude, distance, and other parameters. One is never sure of having the "correct" functional form of a ground motion equations. This is first part of analysis. Function of that we have the peak ground acceleration in site and later by transforming it in intensities we get in real time the shake map. Ground motions are converted to color-coded seismic intensity to show potential damage and perceived shaking level at all locations. Additional maps provide information on specific frequencies of shaking waves, that can be used to anticipate the response of different types of buildings to the ground motion. These are useful for estimating which areas are most likely to have damaged buildings and utility and transportation lifelines. After a damaging earthquake, emergency managers must quickly find answers to important questions: Where is the most serious damage? The next uncertainties are in connection to nonlinear soil behavior during of strong and deep Vrancea earthquakes in cities and metropolitan areas where thick Quaternary sediments exist in all extra-Carpathian area . The real evidence of site effects from source to freefield analysis is conducted by using spectral amplification factors for last strong and deep Vrancea earthquakes (March 04,1977;MW =7.5;h=94.5 km; August 30,1986;MW=7.1;h=134.5km; May 30 1009; MW= 6.0;h=90.9 km; May 31, 1990; MW=6.4; h=86.9 km). The amplification factors decrease with increasing the magnitudes of strong Vrancea earthquakes and these values are far of that given by Regulatory Guide 1.60 of the U. S. Atomic Energy Commission and IAEA Vienna. A characteristic of the nonlinearity is a systematic decrease in variability of peak ground accelerations with increasing earthquake magnitude. The analysis made for example in Bacau seismic station indicates that the effect of nonlinearity could be very important and if the analysis is made for peak accelerations , it is 48.87% smaller assuming that response of soil to earthquake with MW=6.4 is still in elastic domain. In other 25 seismic stations from extra-Carpathian area there are values between 14.2% and 55.4%.Consequently,the shake map is different and is far of reality during a strong Vrancea earthquake. On the other hand, it is well known that intensity distribution during strong Vrancea earthquake is a function of depth; if the depth is smaller than 110 km , the maximum intensities are from epicenter to Bucharest and if the depth is deeper than 110 km, the maximum distribution is in epicenter, Moldova and Chisinau from Rep. of Moldova. Having this information in real time will result in lives saved and reduction in property damages.