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Soil Deposit Response due to Crustal Seismogenic Zone of Fagaras-Campulung, Romania

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Seismic hazard in Romania is dominated by the Vrancea intermediate-depth events. In the same time, at local scale the hazard generated by the superficial sources can not be neglected. An important zone affected by crustal earthquakes is Fagaras-Campulung seismic area where at least once per century are reported effects of VIII+ and/or IX MSK. In order to mitigate the seismic risk of the vulnerable man-made structures (bridges, large dams), we are investigating the local effects at certain sites in this mountainous area.
The aim of this paper is to evaluate the seismic effects induced in the local structure of the Fagaras-Campulung area. A complex geotectonic and physical-lithological analysis has been carried out for the area of interest, which has the geographical limits between 45.0 – 46.00 North latitude and 24.00 - 25.80 East longitude. Seismicity of the area is presented with a history of seismic activity, majority of events are 2-3 MW but there are also some greater ones (28 seismic events with magnitude greater than 3.9 MW took place between years 1517-2008). Also is presented the hypocentral distribution of seismic events function of depths, where the majority of sources ($\sim$ 1070) are at depths no more than 20km. We present the epicenters distribution on a topographic surface, together with focal mechanisms of the events. As a consequence, three seismic scenarios are taken into account to evaluate the expected accelerations and local soil response for Fagaras-Campulung zone.
There are presented accelerations and response spectra (with 3 damping 5%, 10% and 20%) at Campulung-Muscel bedrock.
Nonlinear effects induced by significant deformations need a certain approximated method – linear equivalent - for a multistratified zone as we considered for the Fagaras-Campulung superficial areas. Therefore important nonlinear variations of shear modulus and damping functions with state of strain during earthquakes were evidenced in superficial soils. The obtained response spectra (with 3 different damping values) and the transfer functions of the superficial layers shows important amplifications at the studied sites.
All these give us a very complete image of the local response effects on the seismic hazard in Fagaras - Campulung zone. Therefore, these results could be considered in the design of large structures (civil and industrial) in the studied area.

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