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Prediction of soil factor, S, based on field investigations and empirical correlations

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Strong ground shaking and the records from seismic networks have outlined that variability and specific parameters of near-surface layered deposits represents one of key component in site-response analysis. To assess seismic effects an accurate determination of local soil characteristics/conditions beneath a target site is required. The effects of local soil conditions in defining the ground motion and soil-structure interaction are included in the modern seismic codes by specify design spectra as function of soil conditions at the site.
The present process of harmonization of Romania's seismic code P100-1 with European Eurocode 8 requires the assessment of the effect of local site conditions, through the soil factor, S, which should be specified in the National Annex of Eurocode 8.
A study for evaluation of soil condition factor, S, was performed for 112 sites with seismic stations from Romania, Bulgaria, Serbia and Republic of Moldova. The strong ground motion data used in the analysis are recorded from 9 Vrancea intermediate-depth earthquakes having moment magnitudes Mw $\geq$ 5.2. The recorded ground motions were collected for BIGSEES research project and were recorded by four seismic networks: INFP, URBAN-INCERC, CNRRS and GEOTEC. The database consists of 233 seismic ground motions (465 horizontal components). For analysis consistency the local soil conditions at the seismic stations sites were characterized using Vs,30 values estimated using Wald and Allan (2007) methodology. An comparison of shear wave velocities values (Vs,30), with the values obtained from the accurate measurement of velocity surveys in boreholes are presented.
The soil factor is computed using Ray et. al. (2002) and Pitilakis et. al. (2012, 2013) methodology. Soil classes were classified according to soil categories defined by Eurocode 8 and to soil categories defined by the corner period Tc as described in Romanian seismic design code P100-1/2013.
In the present paper the authors have made an attempt to obtain a comprehensive database to be used in site response analysis by predicting the potential effect of site conditions on similar soil types, layer sequences and properties.

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