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Selection and ranking of GMPEs for seismic hazard analysis in Bulgaria

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Estimation of probabilistic seismic hazard for a region is one the most important challenges in the field of seismology. Moreover, it is a key step for the evaluation of seismic risk and loss estimation for a region.
Ground Motion Prediction Equations-GMPEs define the values of a ground motion parameter as a function of earthquake size (magnitude M) and the distance in terms of both expected values and dispersion of the expected values. GMPEs are essential in probabilistic seismic hazard studies for estimating the ground motions generated by the seismic sources. One of the most critical steps of seismic hazard and risk analysis is selecting the appropriate GMPEs to address strong ground motion based on earthquake parameters. In fact, appropriate modeling of this epistemic source of uncertainty in analysis is a non-trivial approach. From statistical point of view, this issue can be resolved by measuring the good-of-fit, which describes how well a model fits a set of observations.
In this study, the suitability of selected GMPEs for shallow and intermediate earthquakes (seismotectonic region Vrancea, Romania) is tested on the base of a large dataset of ground motion data from Bulgarian and Romanian seismological networks, and from System of Accelerographs for Seismic Monitoring of Equipment and Structures deployed in Kozloduy NPP. Nine attenuation relationships (six for shallow and tree for intermediate depth earthquakes) were selected on the base of general criteria. The LLH approach is used for quantifying the goodness of fit of the selected relations.