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Unified Scaling Law for Earthquakes: Seismic hazard and risk assessment for Himalayas, Lake Baikal, and Central China regions

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The Unified Scaling Law for Earthquakes (USLE), that generalizes the Gutenberg–Richter recurrence relation, has evident implications since any estimate of seismic hazard depends on the size of the territory that is used for investigation, averaging, and extrapolation into the future. Therefore, the hazard may differ dramatically when scaled down to the proportion of the area of interest (e.g. territory occupied by a city) from the enveloping area of investigation. In fact, given the observed patterns of distributed seismic activity the results of multi-scale analysis embedded in USLE approach demonstrate that traditional estimations of seismic hazard and risks for cities and urban agglomerations are usually underestimated. Moreover, the USLE approach provides a significant improvement when compared to the results of probabilistic seismic hazard analysis, e.g. the maps resulted from the Global Seismic Hazard Assessment Project (GSHAP). We apply the USLE approach to evaluating seismic hazard and risks to population of the three territories of different size representing a sub-continental and two different regional scales of analysis, i.e. the Himalayas and surroundings, Lake Baikal, and Central China regions.