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Earthquake-triggered liquefaction in Southern Siberia and surroundings: a base for predictive models and seismic hazard estimation

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The forms and location patterns of soil liquefaction induced by earthquakes in southern Siberia, Mongolia, and northern Kazakhstan in 1950 through 2014 have been investigated, using field methods and a database of coseismic effects created as a GIS MapInfo application, with a handy input box for large data arrays. Statistical analysis of the data has revealed regional relationships between the magnitude (Ms) of an earthquake and the maximum distance of its environmental effect to the epicenter and to the causative fault (Lunina et al., 2014). Estimated limit distances to the fault for the Ms = 8.1 largest event are 130 km that is 3.5 times as short as those to the epicenter, which is 450 km. Along with this the wider of the fault the less liquefaction cases happen. 93% of them are within 40 km from the causative fault. Analysis of liquefaction locations relative to nearest faults in southern East Siberia shows the distances to be within 8 km but 69% of all cases are within 1 km. As a result, predictive models have been created for locations of seismic liquefaction, assuming a fault pattern for some parts of the Baikal rift zone. Base on our field and world data, equations have been suggested to relate the maximum sizes of liquefaction-induced clastic dikes (maximum width, visible maximum height and intensity index of clastic dikes) with Ms and local shaking intensity corresponding to the MSK-64 macroseismic intensity scale (Lunina and Gladkov, 2015). The obtained results make basis for modeling the distribution of the geohazard for the purposes of prediction and for estimating the earthquake parameters from liquefaction-induced clastic dikes.
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