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Seismic Hazard and Risk Assessment in Multi-Hazard Prone Urban Areas: The Case Study of Cologne, Germany

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Most hazard and risk assessment studies usually analyze and represent different kinds of hazards and risks separately, although risk assessment and mitigation programs in multi-hazard prone urban areas should take into consideration possible interactions of different hazards. This is particularly true for communities located in seismically active zones, where, on the one hand, earthquakes are capable of triggering other types of hazards, while, on the other hand, one should bear in mind that temporal coincidence or succession of different hazardous events may influence the vulnerability of the existing built environment and, correspondingly, the level of the total risk. Therefore, possible inter-dependencies and inter-influences of different hazards should be reflected properly in the hazard, vulnerability and risk analyses.
This work presents some methodological aspects and preliminary results of a study being implemented within the framework of the MATRIX (New Multi-Hazard and Multi-Risk Assessment Methods for Europe) project. One of the test cases of the MATRIX project is the city of Cologne, which is one of the largest cities of Germany. The area of Cologne, being exposed to windstorm, flood and earthquake hazards, has already been considered in comparative risk assessments. However, possible interactions of these different hazards have been neglected. The present study is aimed at the further development of a holistic multi-risk assessment methodology, taking into consideration possible time coincidence and inter-influences of flooding and earthquakes in the area.