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The hazard and risk assessment of Taipei Metropolitan through earthquake scenario from open data

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Modeling seismic hazard based on the ground motion scenario through numerical simulation could enhance the earthquake prevention strategy, especially for highly populated urban region. Taiwan as an earthquake prone country, it is important to provide the earthquake awareness through multiple risk (impact and loss) scenarios. These end-to-end hazard and risk scenarios will increase the resilience of society to extreme earthquake events by identifying the factors critical to society in the earthquake hazard and risk scenarios. The results will help to provide resilient urban development and future design by understanding and strengthening societal capacity for resilience. Taking advantage on the open data policy, we collected the dense seismic data and open exposure data in buildings in the Taipei Metropolitan to develop the task of the end-to-end hazard and risk scenarios. The seismic hazard was made through earthquake scenario from the rupture of the Shanchiao fault, which is to the west of the Taipei basin. The topography and velocity structure of the basin were taken into account in the simulation to explore the long duration of shaking and basin effect, together with thorough evaluation on site amplification of densely populated seismic stations within the basin. We explore the assessment of scenario-based loss estimation with the exposure model of 500x500 meter grid-based data from National Science and Technology Center for Disaster Reduction (NCDR) and the governmental open data consisted of Taipei building user license information and open street map shape file data. For building damage estimation, we developed building damage based fragility curves including 1999 Chi-Chi and 2016 Meinong earthquakes for the ground motion in PGA, PGV and Intensity. We also considered the acceleration response spectrum (Sa) and velocity response spectrum (Sv) in different interval of period. Through the development of the end members, we hope to build the earthquake hazard and risk scenarios to ensure effective disaster response from up-to-date, open, transparent and reliable risk-data.

