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Earthquake Loss Estimation Uncertainties

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The paper addresses the reliability issues of strong earthquakes loss assessment following strong earthquakes with worldwide Systems' application in emergency mode. Timely and correct action just after an event can result in significant benefits in saving lives. In this case the information about possible damage and expected number of casualties is very critical for taking decision about search, rescue operations and offering humanitarian assistance. Such rough information may be provided by, first of all, global systems, in emergency mode. The experience of earthquakes disasters in different earthquake-prone countries shows that the officials who are in charge of emergency response at national and international levels are often lacking prompt and reliable information on the disaster scope.

Uncertainties on the parameters used in the estimation process are numerous and large: knowledge about physical phenomena and uncertainties on the parameters used to describe them; global adequacy of modeling techniques to the actual physical phenomena; actual distribution of population at risk at the very time of the shaking (with respect to immediate threat: buildings or the like); knowledge about the source of shaking, etc. Needless to be a sharp specialist to understand, for example, that the way a given building responds to a given shaking obeys mechanical laws which are poorly known (if not out of the reach of engineers for a large portion of the building stock); if a carefully engineered modern building is approximately predictable, this is far not the case for older buildings which make up the bulk of inhabited buildings. The way population, inside the buildings at the time of shaking, is affected by the physical damage caused to the buildings is not precisely known, by far.

The paper analyzes the influence of uncertainties in strong event parameters determination by Alert Seismological Surveys, of simulation models used at all stages from, estimating shaking intensity to assessing the damage to different elements at risk, of the databases on different elements at risk, such as population and building stock distribution, as well critical facilities characteristics, on the reliability of expected loss estimations at regional and global scale.