Rapid Earthquake Impact Modelling – GPU-powered intensity modelling cartography in social media

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Earthquakes are felt every day all around the globe. In some cases, damaging effects cannot be avoided and it is difficult, especially during bigger disasters, to estimate the actual impact. First estimates of the earthquake intensity are important to estimate potential losses and the number of affected people. For this task, a system for disaster cartography has been developed to provide potential disaster impact maps within minutes after an event occurred. Such data can then be used e.g. for loss estimates, mitigation measures, awareness or media.

In case of an earthquake, only a little data is available relatively quickly, however with little information, the system can compute the spatial extent of earthquake intensities. A Monte Carlo simulation computes several 1000s of potential permutations using GPU performance of that same earthquake to take uncertainties regarding depth, location and magnitude into account. Ground motion and intensity is simulated using a database of global ground motion and macro seismic intensity prediction equations. The results are then calibrated through first observations and testimonies retrieved from EMSC, USGS, earthquake-report.com and social media. The system has been calibrated by various recent and historic events and is under constant development providing an alternative (European) solution to USGS ShakeMaps and local agencies. The final maps are shared in social media, Facebook & Twitter and used by various partners. Currently, the system is operational for earthquakes globally. During the September 2017 Mexico earthquake a first attempt to not only apply the same methodology to earthquakes but also to tsunamis was successful.