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Use of seismic wave propagation data for loss estimates in QUAKELOSS2: from regional to local

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Since 2003, 335 loss reports after major earthquakes worldwide have been posted with an average delay of 40 minutes. Loss estimates we compute contain a map showing the average degree of damage in settlements near the epicenter, the total number of fatalities, the total number of injured, and the detailed list of the casualties and damage rates in these settlements. We are in the process of upgrading the computer code and data base to generate an open source tool: QUAKELOSS2. The input parameters that need to be calibrated on a regional to local basis include: (1) Attenuation relationship, (2) soil conditions, (3) building stock properties, and (4) the human losses matrix. Progress on points (3) and (4) is reported in a parallel abstract, where calculated results are compared to observed ones for M6.6 Bam earthquake. Here, we present the preliminary results on points (1) and (2).

As a first step we implement regional attenuation relationships and then we place amplification factors for cities into the data base. Two procedures are used to document cities with amplification factors: a regional one derived from the USGS Global Vs30 Map Server and a local one that focuses on specific cities where microzoning is available. At the regional level, rectangular Vs30 grids are extracted in order to cover seismogenic areas of the world. Then the average Vs30 value is calculated for each settlement considering neighborhood values at a given distance. At the local level, cities are divided into districts with different amplification factors, based on the available microzoning. The subdivision derives from soil classification, but also from existing data of building stock and population. These factors are obtained independently of calibration attempts. As far as possible, our input data on seismic wave propagation

are validated by comparing the calculated intensities with the observed ones for cities damaged by recent earthquakes. In cases where the observed and calculated human losses do not agree, it can be difficult to decide which of the parameters (1) through (4) needs to be adjusted. Our choice is to adjust (within reasonable bounds) the parameter(s) judged to be the least well known. In most cases, not all four parameters are known, thus we are forced to select some by expert judgment. Focusing on the developing world and large cities in moderate to very high seismic hazard regions, we have a list of 72 cities in which we are implementing amplification factors and regional attenuation laws.

To expand and deepen our database for estimating the amount of strong ground motion in case of future earthquakes, we seek the help of experts in possession of information on microzonation and regional attenuation data.