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INTERNATIONAL SEISMIC SAFETY ORGANIZATION

SPECIAL ISSUE

August 24, 2016 Earthquake in Amatrice, M 6.2

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Italy was hit again by a damaging earthquake during the night of August 24, 2016. Different values of magnitude have been assigned to the quake by different agencies ranging from M6 to M6.2. The estimated number of human losses is still unclear but is approaching a number of 250. The ISSO community extends its sympathy to the victims as rescue and relief work continues. The consequences of the earthquake and many of the accompanying news distributed by news media show some similarity with the L'Aquila earthquake. Again the damage is surprisingly high if compared with other recent earthquakes exceeding magnitude 8 in Chile or magnitude 7 in Japan indicating an insufficient preparation for earthquakes in Italy. This may be attributed to the relatively high age of the building stock in the region. But there are other issues that rise some concern:

1) Again a pre-shock sequence of earthquakes was observed that obviously didn't trigger any alert. Although it may be difficult to identify a set of small earthquakes as a pre-shock before the event, experience from past earthquakes should have triggered some caution.
2) Again the Probabilistic Seismic Hazard (PSHA) maps of Italy underestimated the quake (PGA=0.24g, for 10% probability of exceedance in 50 years). Civil Engineering building codes are relying on this number. Peak values registered indicate a PGA of 0.45g. This indicates that even newer buildings would have been designed. Inadequately.

This tragic event indicates again how important it is to be prepared for the Maximum Credible Earthquake (MCE).

The current PSHA map of Italy and the associated building code are following a risk—based approach regarding events like in Amatrice or L'Aquila as tolerable events because they are rare. This is the true root cause why Italy is not prepared even for rather moderate earthquakes. The event underlines also another point. Seismologists and earthquake engineers may discuss in very detail the values of pga crunching numbers and modifying values by a few percent to take into account all types of uncertainty. Here the question is more simple. Looking at the damage pattern the epicentral intensity was most likely intensity 9 (EMS-98). Reviewing the experience from earthquakes in Italy it can easily be concluded that critical infrastructures and lifelines in Italy have to be designed for earthquakes in the range of intensity 8 to 9 graded based on the well-known geology and seismo-tectonics of the country. It is quite easy to establish these values even without deep research. The European database of recorded earthquakes contains a significant number of time-series for this intensity range to allow to transfer this information into engineering parameters directly. Therefore, it is easy for earthquake engineers to design new buildings or to develop counter measures to retrofit the existing building stock to ensure sufficient seismic robustness.

The position of ISSO is clear. Human lives are valuable and their loss is not a tolerable risk. Public safety and disaster prevention shall be based on the Maximum Credible Earthquake (MCE) that can easily be defined in terms of intensity and converted into engineering parameters needed by structural engineers. A large scale seismic retrofit program for Italy is needed and will help to avoid future victims. The know-how is available. The decision makers have to move on.

Rescue actions after the quake.

The damage pattern resembles an Intensity 9. A high percentage of masonry buildings of vulnerability class A is completely destroyed in the epicentral region.

Search for Survivors

Complete damage of a building of vulnerability class A, while buildings of vulnerability class B (increased stiffness due to the connection to adjacent buildings) survived.