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Classification of collapsed buildings for fast damage and loss assessment

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Fast and reliable identification of collapsed buildings is essential in case of earthquake disasters in urban areas. Airborne laserscanning offers the possibility to fulfil this task. Based on height measurements with airborne laser scanning, geometrical surface models of buildings can be generated. Comparing the undamaged models gathered before an event with those recorded after an earthquake, the location of collapsed buildings and the dimension and characteristic of their damage can be obtained. To interpret the found changes between the pre- and post event surface models of the buildings, the knowledge about typical damage types of collapsed buildings is necessary. Existing building damage classifications don't meet the requirements of this novel technique. For this reason, observations and reports of building collapses were analysed leading to a classification of collapsed buildings and the definition of the so-called damage catalogue.

The *damage catalogue* is a compilation of different damage types of entire buildings typically occurring after earthquakes and contains the observed dimensions of the geometrical characteristics like volume reduction or change of the inclination for each damage type. Besides the detectability of these geometrical characteristics in airborne laserscanning data, the differentiation of the damage types takes into account effects on casualty numbers and on different search and rescue (SAR) needs. The damage catalogue was worked out by analysis of the associated database.

The *damage catalogue database* contains the characterisation of real damaged buildings by the defined geometrical characteristics. This was carried out on the basis of photographies of the collapsed structures, which are also included in the database.

The presentation will include the conception and the implementation of the damage

catalogue and of the associated database, their use for the above described reconnaissance technique and their application possibilities for casualty estimation and the ascertainment of the needed SAR resources after earthquakes.

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