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The New Multi-HAzard and MulTi-RIsK Assessment MethodS for Europe (MATRIX) Project – An overview of its major findings

Kevin Fleming (1), Jochen Zschau (2), Paolo Gasparini (3), and the MATRIX Consortium Team

(1) GFZ German Research Centre for Geosciences, Potsdam, Germany (kevin@gfz-potsdam.de), (2) Centre for Disaster Management and Risk Reduction Technology, Potsdam, Germany, (3) AMRA Scarl, Naples, Italy

Recent major natural disasters, such as the 2011 Tōhoku earthquake, tsunami and subsequent Fukushima nuclear accident, have raised awareness of the frequent and potentially far-reaching interconnections between natural hazards. Such interactions occur at the hazard level, where an initial hazard may trigger other events (e.g., an earthquake triggering a tsunami) or several events may occur concurrently (or nearly so), e.g., severe weather around the same time as an earthquake. Interactions also occur at the vulnerability level, where the initial event may make the affected community more susceptible to the negative consequences of another event (e.g., an earthquake weakens buildings, which are then damaged further by windstorms). There is also a temporal element involved, where changes in exposure may alter the total risk to a given area. In short, there is the likelihood that the total risk estimated when considering multiple hazard and risks and their interactions is greater than the sum of their individual parts.

It is with these issues in mind that the European Commission, under their FP7 program, supported the New Multi-HAzard and MulTi-RIsK Assessment MethodS for Europe or MATRIX project (10.2010 to 12.2013). MATRIX set out to tackle multiple natural hazards (i.e. those of concern to Europe, namely earthquakes, landslides, volcanos, tsunamis, wild fires, storms and fluvial and coastal flooding) and risks within a common theoretical framework. The MATRIX work plan proceeded from an assessment of single-type risk methodologies (including how uncertainties should be treated), cascade effects within a multi-hazard environment, time-dependent vulnerability, decision making and support for multi-hazard mitigation and adaption, and an assessment of how the multi-hazard and risk viewpoint may be integrated into current decision making and risk mitigation programs, considering the existing single-hazard and risk focus. Three test sites were considered during the project: Naples, Cologne, and the French West Indies. In addition, a software platform, the MATRIX-Common IT sYstem (MATRIX-CITY), was developed to allow the evaluation of characteristic multi-hazard and risk scenarios in comparison to single-type analyses. This presentation therefore outlines the more significant outcomes of the project, in particular those dealing with the harmonization of single-type hazards, cascade event analysis, time-dependent vulnerability changes and the response of the disaster management community to the MATRIX point of view.