Geophysical Research Abstracts
Vol. 12, EGU2010-3331, 2010
EGU General Assembly 2010

Consideration of Hazard Interactions in Medium-Scale Multi-Hazard Risk Analyses

Melanie S. Kappes, Margreth Keiler, and Thomas Glade
University of Vienna, Institute of Geography, Austria (melanie.kappes@univie.ac.at)

Scientific investigation concerning natural hazards still focuses on enhancement of single hazard analyses and the perception is a persisting need of higher data quantities, more detailed analyses and models. In contrast, practitioners still use quite simple approaches to describe the existing hazard and risk in a certain area. This includes in most cases a variety of different hazards exhibiting distinct characteristics, performing diverse effects on structures and buildings, acting at various temporal and spatial scales. However, an integral analysis of a multitude of processes is not only the sum of single analyses but should be the outcome of a coherent multi-hazard risk analysis (MHRA) aiming at a previously by the stakeholders defined objective. Thus there is a need for the development of a general workflow, the selection of models, being aware of their inherent assumptions and uncertainties, and furthermore the consideration of interactions and domino effects.
This study aims at the development of a medium-scale MHRA concept as a first step to give an overview over a mostly unknown area which does not exhibit an inventory of past events. It is thus constituted of simple models and the input needed is held low to assure its transferability.
The interactions are considered by a qualitative approach and classified into three types: 1) spatial coincidence, 2) temporal coincidence and 3) spatio-temporal coincidence. Spatial coincidence (1) refers to processes affecting the same spatial area, among others to processes occurring under similar environmental conditions. A very interesting aspect is the consequence of such a coincidence on the risk emerging for elements at risk located in such an area. The areas affected are identified by simple overlay of the single hazard modelling results. Temporal coincidence (2) is in most cases linked to the same triggering event although occasional occurrence is possible as well. Maps for each respective triggering process causing several threats can help especially emergency managers to be prepared in the future. Spatio-temporal coincidence (3) addresses the cases of domino-chains where one process triggers the next and an additional, previously not known threat arises. The identification of locations where this type of interaction could happen is done by overlay of the hazard maps in combination with a matrix opposing all processes to each other. Qualitatively the possible impact one could have on the other is inserted into the matrix. By identifying on the map the respective coincidence of two processes possibly affecting each other, the possible effect is assigned, on a more detailed level the scenario can be elaborated and its probability estimated.
Assumptions that have to be made for medium-scale modelling, inherent uncertainties of the models, often low data quality etc. have to be kept in mind when interpreting the results. However, a first medium-scale MHRA serves as support in locating hazard and risk hotspots as a first overview and forms a basis for further more detailed investigation.