

MultiRISK - An innovative conceptual approach to model natural risks

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Snow avalanches, slush flows, rock falls, and debris flows typically occur in Arctic and Alpine regions. Often, they are an enormous threat to population and infrastructure, posing multiple risks to the same region and locality. Commonly, the respective processes are modelled individually in different software programmes with separate data management, and only the results of the single processes are finally summarized and displayed in a GIS. Therefore, fundamental research is needed regarding integrative and multi-processual modelling of natural risks, in order to develop a comprehensive, modular risk analysis tool to calculate different natural risks for one area, e.g. with seasonal differentiation.

The aim of this dissertation project is to develop a GIS software extension for modelling multiple risks by different processes (rock fall, snow avalanches, debris flows and slush flows). It will be developed for Northwest Iceland and applied to calculate scenarios of global warming and land-use change. The respective process models will be integrated as modules in a GIS-platform. Modelling is based on DEMs and process related parameters. Hazard run-outs will be calculated and hazard zones derived, depending on the magnitude and frequency of the respective process, so that different scenarios are possible. Consideration of risk elements (e.g. people, houses, infrastructure), their damage potential, and their vulnerabilities to the respective process, leads to delineation of natural risk zones. These can be displayed either for a single process or a process group or for a single object at risk or a large region.

The innovation lies within

1. the integration of all process models in ONE software system,

2. the development of a shared data base,
3. the impartial and repeatable calculation of natural hazard and risk,
4. and especially the possibility to calculate scenarios of climate and land use change and to their consequences in space and time.

The project has a strong application potential: In terms of protecting human beings and assets, it helps to detect and therefore reduce possible damages, maybe even prevent damage. Due to the open, modular structure of the GIS platform the resulting software MultiRISK can be easily utilized in other regions and for other processes.