Geophysical Research Abstracts
Vol. 14, EGU2012-8518, 2012
EGU General Assembly 2012

Hydrological Flooding Scenarios for the Alpine Provinces of Vorarlberg (Austria) and South Tyrol (Italy) in the Framework of Quantitative Risk Analyses

K. Schneeberger (1,2) and M. Huttenlau (1)

(1) alpS – Centre for Climate Change Adaptation Technologies, Innsbruck, (2) Institute of Geography, University Innsbruck

Within the last decades serious flooding events occurred in many parts of Europe, especially mountainous regions in the Eastern Alps were seriously affected. This project was initiated to analyse potential consequences of flooding events in the provinces of Vorarlberg (Austria) and South Tyrol (Italy) on a regional scale.
The general framework of the entire project follows the risk concept and defines first the hazard potential, second the exposures and damage potentials, and third the consequences in terms of losses considering the structural vulnerability of the potentially affected elements at risk.
The main focus of the presented work lies in the analysis of the hydrological hazard potential within the previously mentioned provinces. Therefore, mainly discharge data of river gauging stations are considered. Additional to the methodology of common flood frequency statistics an expansion by temporal, spatial, and causal information is incorporated. Furthermore, differentiated intrinsic hydrological behaviours of the study areas in terms of seasonal characteristics are taken into account.
The hydrological hazard analysis aims to consider the full range of potential hydrological hazard situations within the study areas. So-called flooding footprints, which represent the spatial spreading of documented and potential flooding events, are derived. Since documented loss events are comparatively seldom, the number of documented footprints is low. Hence, a comprehensive database of potential flood footprints based on stochastic analyses should complement the database of documented footprints. This comprehensive database of synthetic footprints is generated by means of Monte Carlo (MC) simulations. Therefore, the distribution functions of the several gauging stations represent the basis of the MC simulations. The dependence structure of the random variables with respect to the gauging stations will be modelled with Copulas.
As presented, the flood footprints are to a great extent generated on the base of existing river gauging stations. The spatial resolution of the preliminary results is defined by the resolution of existing gauging stations. To achieve a higher resolution, established on a community level for the succeeding flood risk assessment, the information of the footprints will be interpolated by geostatistical methods (e.g. Top Kriging).
The integration of these findings with results of loss modelling procedures for different hydraulic loading conditions on a single object basis enables the analysis of loss consequences for the wide range (in terms of spatial distribution) of potential flood scenarios. Furthermore, the results will be integrated into a random generator based analysis procedure to estimated potential, frequency distributions of loss consequences for defined time periods and annual losses, respectively. The results of the flood risk analysis, which consider a high spatial resolution in the context of analyses on a regional scale, are of interest for the general public, public authorities and the insurance industry.