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Back analysis of Swiss flood danger map to define local flood hazards

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The flood hazard maps for the entire Switzerland will be available at the end of 2011. Furthermore, the Swiss territory has been covered by aerial laser scanning (ALS) providing high resolution digital elevation model (DEM). This paper describes the development of a method for analyzing the local flood hazard based on Swiss hazard maps and HR-DEM.

In their original state, Swiss hazard maps are constructed on the basis of an aggregation of information, a matrix intensity, and frequency. The degree of danger represented by the yellow, blue and red zones gives no information on the water level at each point of the territory. The developed method is based on a superposition of the danger map with the HR-DEM to determine the water level in a hazard area. To perform this method, (1) a triangulation is based on the intersection of the hazard map with the HR-DEM. It uses the limits of area where information is contrain. The hazard map perimeter and the boundaries of hazard areas give information on the widest possible overflow in case of flooding. It is also possible to associate it with a return period. (2) Based on these areas and the difference with the DEM, it is possible to calibrate the highest flood level and the extract water levels for the entire area.

This analysis of existing documents opens up interesting perspectives for understanding how infrastructures are threatened by flood hazard by predicting water levels and potential damages to buildings while proposing remedial measures. Indeed, this method allows estimating the water level at each point of a building in case of flooding. It is designed to provide spatial information on water height levels; this offers a different approach of buildings in danger zones. Indeed, it is possible to discern several elements, such as areas of water accumulation involving longer flood duration, possible structural damages to buildings due to high hydrostatic pressure, determination of a local hazard, or the display of water levels in 3D.