



Pluvial and fluvial flooding: integration in probabilistic flood hazard assessment using a coupled rainfall-discharge generator

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Unlike fluvial flooding, pluvial flooding can occur almost anywhere, especially in areas with depressions in the topography and flow paths on the surface. Pluvial flooding is defined as flooding that results from rainfall-generated overland flow before the water enters a river. It is usually associated with rainstorm events >30mm/h.

Although a pluvial flood event may be limited to a relatively small area, it can potentially lead to exceptionally high losses. In the UK, for instance, 40% of the property damage from the large-scale autumn 2000 floods was related to properties outside the indicative flood zone maps. To date, probabilistic flood hazard assessment has mainly focused on fluvial flooding, with the hazard of pluvial flooding commonly being treated separately, neglected or oversimplified.

A new approach for simultaneously assessing the joint hazard of pluvial and fluvial flooding is suggested. It comprises the application of a copula-based stochastic rainfall-discharge generator. Inundation is simulated with ANUGA Hydro, an open source 2D hydrodynamic model. ANUGA Hydro is based on a finite volume method to solve the shallow water equation and it is suitable for modelling rainstorms and hydrographs. Two medium catchments in Europe have been examined for their suitability for the application and validation of the proposed approach.

This new probabilistic approach to simultaneously determine the hazard of pluvial and fluvial flooding is a step forward towards the development of more reliable, all-embracing probabilistic flood hazard and risk assessment techniques. This is especially true as – according to the IPCC - the risk of pluvial flooding is likely to increase even further across most of Europe due to climate change. Moreover, pluvial flooding clearly falls under the scope of the European Flood Directive 2007/60/EC.