



Validation of an integrated flash-flood impacts modeling chain based on insurance claim data

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Up to now, flash flood monitoring and forecasting systems, based on rainfall radar measurements and distributed rainfall-runoff models, generally aimed at estimating flood magnitudes - typically discharges or return periods - at selected river cross-sections. The approach presented here goes one step ahead by proposing an integrated forecasting chain for the direct assessment of flash flood impacts on inhabited areas (number of buildings at risk in the presented case studies). The proposed approach includes, in addition to a distributed rainfall-runoff model, an automatic hydraulic method suited for the computation of flood extent maps on a dense river network and over large territories. The resulting catalogue of flood extent maps is then combined with land use data to build a flood impact curve for each considered river reach: i.e. number of inundated buildings versus discharge. These curves are finally used to compute estimated impacts based on forecasted discharges.

A first application of this approach in the regions of Alès and Draguignan, south-eastern France, has been recently published (Le Bihan et al., 2017). It includes two types of validation results based on two recent well documented major flash floods (respectively the September 2002 and June 2010 floods). First, the automatically computed flood extent maps and corresponding water levels are tested respectively against local reference or observed flood extent maps and against rating curves at available river gauging stations. Second, a rich and comprehensive insurance claim database is used to evaluate the relevance of the estimated impacts.

The presentation will detail these first validation results, and will be mainly focused here on the second part of the work, i.e. the validation of the whole impacts forecasting chain based on insurance claim data. If successful, this approach could indeed be particularly interesting to evaluate flash floods forecasts in ungauged areas. The presentation will detail the methodology used and the main difficulties encountered, related to the specific features of the insurance data, to the fact that there is not a simple one to one match between buildings and insurance policies, and finally to the particularities of the claims vs policies relation. Despite these difficulties, the validation procedure provided encouraging results.

Reference:

Le Bihan, G., Payrastre, O., Gaume, E., Moncoulon, D., and Pons, F.: The challenge of forecasting impacts of flash floods: test of a simplified hydraulic approach and validation based on insurance claim data, *Hydrol. Earth Syst. Sci.*, 21, 5911-5928, <https://doi.org/10.5194/hess-21-5911-2017>, 2017.