

Assessing various approaches for flash flood forecasting in the Yzeron periurban catchment (150 km²) south-east Lyon, France

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The Yzeron periurban catchment (150 km²) is prone to flash floods leading to overflow in the downstream part of the catchment. A prevention and management plan has been approved and the set-up of a flood forecasting system is planned. The present study presents a comparison of several solutions for flood forecasting in the catchment. It is based on an extensive data collection (rain gauges, radar/rain gauge reanalyses, discharge and water level data) from this experimental catchment. A set of rainfall-runoff events leading to floods (problematic and non-problematic floods) was extracted and formed the basis for the definition of a first forecasting method. It is based on data analysis and the identification of explaining factors amongst the following: rainfall amount, intensity, antecedent rainfall, initial discharge. Several statistical methods including Factorial Analysis of Mixed Data and Classification and Regression Tree were used for this purpose. They showed that several classes of problematic floods can be identified. The first one is related to wet conditions characterized with high initial discharge and antecedent rainfall. The second class is driven by rainfall amount, initial discharge and rainfall intensity. Thresholds of these variables can be identified to provide a first warning. The second forecasting method assessed in the study is the system that will be operational in France in 2017, based on the AIGA method (Javelle et al., 2016). For this purpose, 18-year discharge simulation using the hydrological model of the AIGA method, forced using radar/rain gauges reanalysis were available at 44 locations within the catchment. The dates for which quantiles of a given return period were overtopped were identified and compared with the list of problematic events. The AIGA method was found relevant in identifying the most problematic events, but the lead time needs further investigation in order to assess the usefulness for population warning.

References:

Pierre Javelle, Didier Organde, Julie Demargne, Clotilde Saint-Martin, Céline de Saint-Aubin, Léa Garandeau and Bruno Janet (2016). Setting up a French national flash flood warning system for ungauged catchments based on the AIGA method. E3S Web of Conferences 7, 18010 (2016), 3rd European Conference on Flood Risk Management (FLOODrisk 2016), <http://dx.doi.org/10.1051/e3sconf/20160718010>